

**Network  
Administration Guide**

# hp StorageWorks Business Copy EVA/MA/EMA 2.3

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**Part Number:** T3032-96301

This HP StorageWorks Business Copy (BC) for Enterprise Virtual Array (EVA), Modular Array (MA), and Enterprise Modular Array (EMA) document describes the planning and operations required to establish, configure, update, and maintain a BC environment.



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## about this guide

This guide provides information to help you:

- Understand what the Business Copy (BC) product is all about.
- Plan BC environments with and without BC-enabled hosts.
- Prepare prerequisites for establishing BC environments.
- Prepare for initial and update installations of BC software.
- Establish a BC environment through BC software installation.
- Maintain an existing BC network.
- Troubleshoot a BC environment.

“About this Guide” topics include:

- [Overview](#), page 12
- [Conventions](#), page 13
- [Getting help](#), page 14

## Overview

This section covers the following topics:

- [Intended audience](#)
- [Prerequisites](#)

## Intended audience

This book is for anyone who is:

- Preparing an initial installation of a BC environment
- Preparing to update BC software
- Responsible for creating or maintaining BC jobs
- Maintaining and troubleshooting an existing BC environment

## Prerequisites

Tasks in this book require knowledge of BC-supported:

- Storage Area Network (SAN) fabric configurations
- Host operating-system (OS) environments
- HP StorageWorks EVA, MA, and EMA storage systems using the following hardware and software:
  - EVA: HSV110 or HSV100 controllers running virtual controller software (VCS)
  - MA/EMA: HSG80 controllers running array controller software (ACS)
- HP StorageWorks storage managers:
  - EVA: Command View EVA
  - MA/EMA: HSG Element Manager
- Multibus failover configurations
- HP OpenView Storage management appliance (SMA) hardware and software
- HP StorageWorks Continuous Access EVA software, if using EVA storage systems
- HP StorageWorks Data Replication Manager (DRM) software, if using MA/EMA storage systems

BC prerequisites for performing data replication include:

- A supported BC environment
- A valid Business Copy EVA Replication License and license key for the replicated storage capacity
- Installation of supported EVA, MA, or EMA storage systems and storage manager software

## Conventions

Conventions consist of the following:

- [Document conventions](#)
- [Text symbols](#)

### Document conventions

This document follows the conventions in [Table 1](#).

**Table 1: Document Conventions**

Convention	Element
Blue text: <a href="#">Figure 1</a>	Cross-reference links
<b>Bold</b>	Menu items, buttons, and key, tab, and box names
<i>Italics</i>	Text emphasis and document titles in body text
Monospace font	User input, commands, code, file and directory names, and system responses (output and messages)
<i>Monospace, italic font</i>	Command-line and code variables
Blue underlined sans serif font text ( <a href="http://www.hp.com">http://www.hp.com</a> )	Web site addresses

### Text symbols

The following symbols may be found in the text of this guide. They have the following meanings:



**WARNING:** Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or death.



**Caution:** Text set off in this manner indicates that failure to follow directions could result in damage to equipment or data.

**Tip:** Text in a tip provides additional help to readers by providing nonessential or optional techniques, procedures, or shortcuts.

**Note:** Text set off in this manner presents commentary, sidelights, or interesting points of information.

## Getting help

If you still have a question after reading this guide, contact an HP authorized service provider or access our web site: <http://www.hp.com>.

## HP technical support

Telephone numbers for worldwide technical support are listed on the following HP web site: <http://www.hp.com/support/>. From this web site, select the country of origin.

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**Note:** For continuous quality improvement, calls may be recorded or monitored.

---

Be sure to have the following information available before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions

## HP storage web site

The HP web site has the latest information on this product, as well as the latest drivers. Access storage at: <http://www.hp.com/country/us/eng/prodserv/storage.html>. From this web site, select the appropriate product or solution.

To provide feedback on BC features, functionality, or documentation, send e-mail to: [BCFeedback@hp.com](mailto:BCFeedback@hp.com).

## HP authorized reseller

For the name of your nearest HP authorized reseller:

- In the United States, call 1-800-345-1518
- In Canada, call 1-800-263-5868
- Elsewhere, see the HP web site for locations and telephone numbers: <http://www.hp.com>.

# Introduction to Business Copy

## 1

This chapter provides an introduction to BC, including descriptions of BC replication, licensing, software, and network components necessary for a BC environment to perform properly. Other introductory information in this chapter includes various BC job operations, BC kit contents and documentation, and a list of other products that perform BC replication.

Topics include:

- [What is Business Copy replication?](#), page 16
- [What other products perform BC replication?](#), page 24

## What is Business Copy replication?

Business Copy *replication* is a feature of HP StorageWorks arrays that allows you to quickly make local point-in-time copies of your data using various StorageWorks products. All of the products, however, rely on the individual array-specific internal replication engine to rapidly make local copies of the virtual disks for this array.

Topics include:

- [What is replication licensing?](#), page 16
- [What is BC server software?](#), page 16
- [What is BC host agent software?](#), page 17
- [BC network and use example](#), page 18
- [What operations can be performed with BC jobs?](#), page 19
- [How to obtain BC software and documentation](#), page 21

## What is replication licensing?

To perform BC replication, an array must be licensed as follows.

- For EVA arrays—Purchase a BC replication license and install a license key. The license key enables the BC replication features included in the virtual controller software (VCS).
- For MA/EMA arrays—Purchase a BC-supported version of array controller software (ACS). Installing the ACS automatically enables the BC replication features.

For more details, see “[BC Replication Licensing](#)” on page 61.

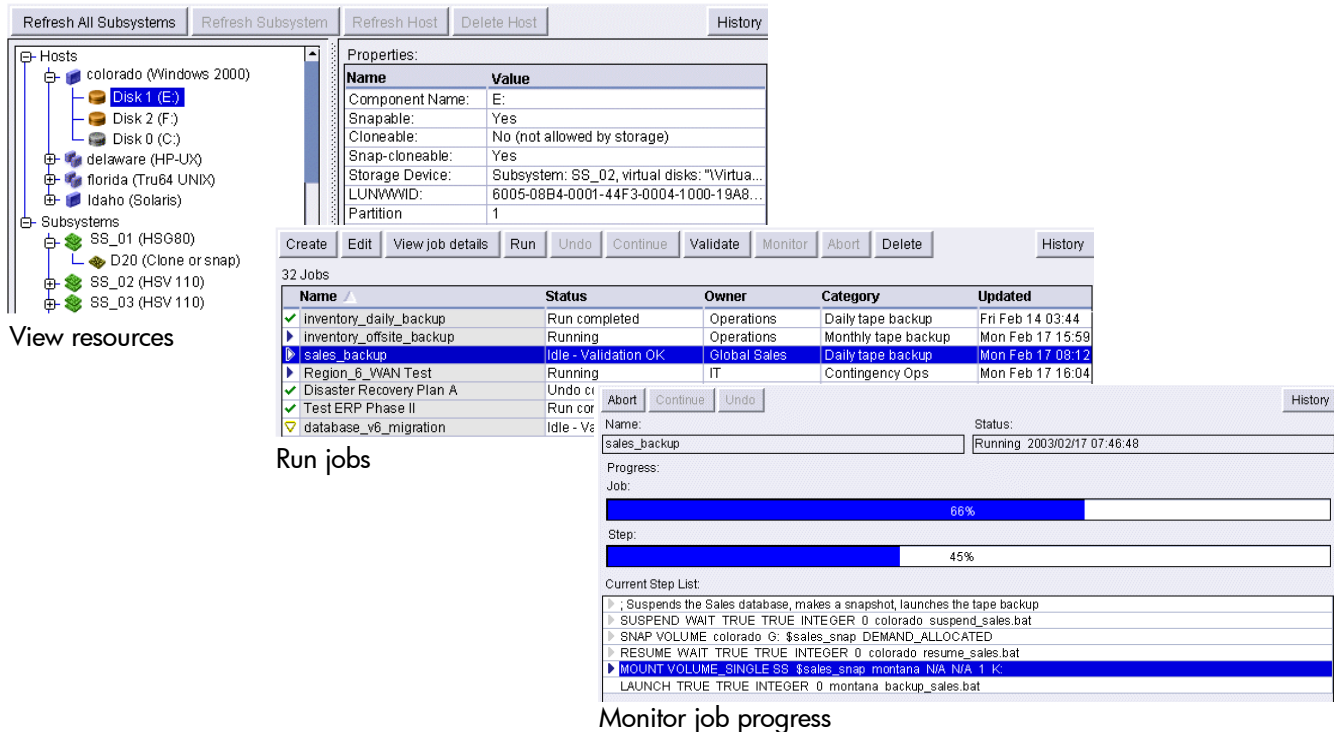
## What is BC server software?

BC server software is an advanced replication management tool that simplifies and automates replication tasks by using *BC jobs*. When used in conjunction with BC host agent software, BC jobs can dynamically mount virtual disks and interact with the host applications.

The BC server software includes a browser-based graphical user interface (GUI) (see [Figure 1](#)) that allows you to:

- Manage BC replication activities on multiple arrays.
- Quickly create BC jobs using the integrated job editor and job templates.
- Validate BC job operation logic and syntax before running the job.
- Run BC jobs on demand or using an integrated scheduler.
- Monitor BC job progress and view detailed job activity logs.
- View array and virtual disk resources.
- View hosts and host volume resources (requires BC host agent software).





**Figure 1: BC GUI displays**

No additional licensing is required to use BC server software. A single installation of the BC server can simultaneously support multiple EVA and MA/EMA arrays. For additional planning and requirements information, see “[Configuration and Update Planning](#)” on page 25 and “[BC environment requirements](#)” on page 42.

## What is BC host agent software?

BC host agent software installations create *BC-enabled hosts*, which provide OS-specific tools that enable BC job interactions with hosts. When a host is BC-enabled, you can create BC jobs that:

- Perform BC replication by specifying the host and host volume name.
- Mount virtual disks on the host without rebooting the host (dynamic mount).
- Suspend and resume application I/O on the host.
- Launch (run) applications on the host.

BC host agent software also provides interactions with:

- OSs, file systems, logical volume managers, and cluster software.
- Fibre Channel HBAs, multi-pathing software, and LANs.
- Database, backup, and other applications.

Installing the BC host agent software also installs a BC command line program called EVMCL. With EVMCL, you can:

- Run BC jobs from a host computer command line interface.
- Write scripts that run BC jobs via EVMCL.

EVMCL includes return codes that allow conditional interactions between BC jobs and host scripts. [Figure 2](#) illustrates part of the EVMCL interface.

```
hp StorageWorks business copy
evmcl (version 2.2 build=40) Copyright (C) 1998-2003 Hewlett-Packard Company

Syntax:  evmcl [option]
         where option is one of -?, -v, -ini
         -?   print this help
         -v   print evmcl version information
         -ini  create a new EVMcl.ini file with all supported commands.
               If EVMcl.ini already exists, it is copied to EVMcl-ini.bak.

         evmcl <appliance> <bc_command> <bc_job> [/output=filename.ext] [/i]
         where /i allows evmcl to return immediately,
               otherwise, evmcl waits for <bc_command> to complete.
         and /output=filename.ext allows all XML to be output to the named file.

Example: evmcl swma999999 run "clone database job" /i

Commands: abort   continue   execute   getjoblist run
           status  statusdetail undo   validate

           note: execute and run are equivalent commands.

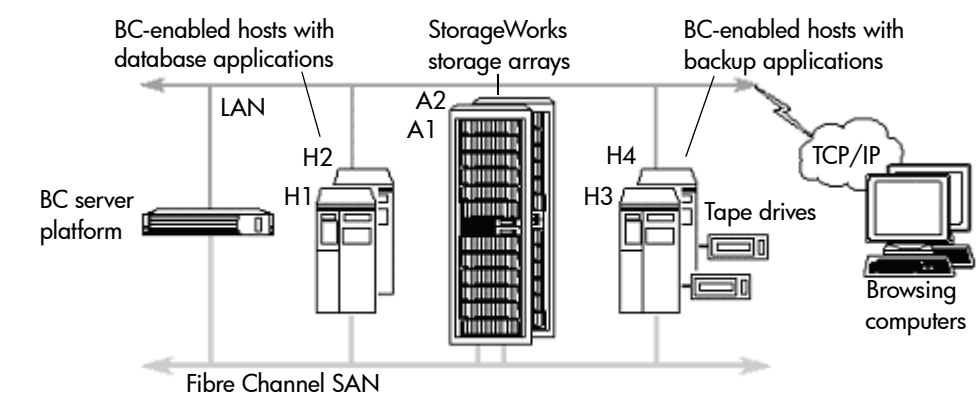
For more help on evmcl, browse to the business copy online Help/User Guide
```

**Figure 2: EVMCL help menu example**

No additional licensing is required to use BC host agent software. For additional planning and requirements information, see [“Configuration and Update Planning”](#) on page 25 and [“BC-enabled host requirements and support”](#) on page 49.

**BC network and use example**

[Figure 3](#) shows a BC network that consists of a BC server platform connected by a LAN to BC-enabled host computers. This configuration includes multiple storage system arrays, multiple hosts with database applications, and multiple hosts with backup applications. For clarity, only two of each are shown.



Reference	Description	Host application
A1	EVA array	Oracle® for HP-UX Exchange Server
A2	MA/EMA array	
H1	Host with HP-UX connected to array A1	VERITAS NetBackup for HP-UX VERITAS Backup Exec for Windows
H2	Host with Microsoft® Windows® connected to array A2	
H3	Host with HP-UX connected to array A1	VERITAS NetBackup for HP-UX VERITAS Backup Exec for Windows
H4	Host with Windows connected to array A2	

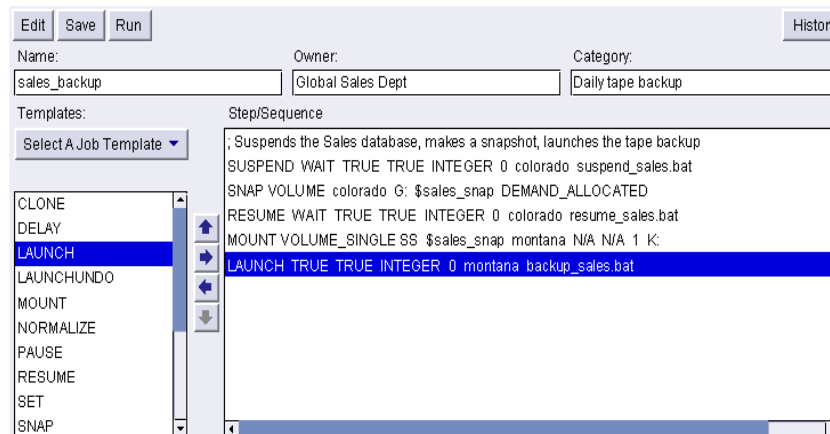
**Figure 3: BC network example**

An administrator of a large SAN could use this configuration and BC jobs to perform simultaneous, non-disruptive tape backups of the Oracle and Microsoft Exchange Server databases. To run daily backups, for example, the administrator might create two jobs, each performing the following steps with their respective resources:

1. Momentarily suspend host application I/O to the array.
2. Make an instantaneous snapshot of the database on the array.
3. Immediately resume host application I/O to the array.
4. Dynamically mount the snapshot on a host for tape backup.
5. Launch a tape backup and wait for successful completion of the backup.
6. On completion of the backup, begin an “undo” to unmount the snapshot, delete the snapshot from the array, and return the snapshot disk space to general availability.

## What operations can be performed with BC jobs?

The BC server integrated job editor provides a rich set of operations for simplifying replication tasks. You can select a job template or create your own by simply dragging and dropping operations into the step-sequence window. Operation parameters are completed by choosing resources from drop-down lists or by entering resource names.



**Figure 4: BC server integrated job editor**

See [Table 2](#), [Table 3](#), and [Table 4](#) for a summary of BC job operations. Refer to the BC Online Help & User Guide for instructions on using these operations and for OS-specific details.

**Table 2: BC job operations with arrays**

Operations with arrays	EVA	MA/EMA	Remarks
<b>Replication operations</b>			
clone unit		✓	
clone volume		✓	Requires a BC-enabled host
normalize unit	✓	✓	
normalize volume	✓	✓	Requires a BC-enabled host
snap unit (snapshot, demand allocated)	✓		
snap unit (snapshot, fully allocated)	✓	✓	

**Table 2: BC job operations with arrays (continued)**

Operations with arrays	EVA	MA/EMA	Remarks
snap unit, snapclone	✓	✓	
snap volume (snapshot, demand allocated)	✓		Requires a BC-enabled host
snap volume (snapshot, fully allocated)	✓	✓	Requires a BC-enabled host
snap volume, snapclone	✓		Requires a BC-enabled host
split unit		✓	
split volume		✓	Requires a BC-enabled host
split_begin unit		✓	
split_begin volume		✓	Requires a BC-enabled host
split_finish unit		✓	
split_finish volume		✓	Requires a BC-enabled host
<b>Other operations</b>			
set ca_subsystem	✓		
set diskgroup	✓		

**Table 3: BC job operations with hosts**

Operations with hosts	Remarks
launch	Requires a BC-enabled host
launchundo	Requires a BC-enabled host
mount unit	Requires a BC-enabled host
mount volume_all	Requires a BC-enabled host
mount volume_single	Requires a BC-enabled host
resume	Requires a BC-enabled host
suspend	Requires a BC-enabled host
unmount	Requires a BC-enabled host

**Table 4: Internal BC job operations**

Internal operations	Remarks
delay	
pause	
set unit_bcv	
set volume_bcv	
undo	
waituntil	

## How to obtain BC software and documentation

The BC server software, host agent software, and documentation are available for download from the Web at <http://h18000.www1.hp.com/products/storage/software/bizcopyeva/index.html>. The Business Copy EVA kit, which supports both EVA and MA/EMA arrays, can be ordered from HP.

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**Note:** BC is available to new customers in a kit form that must be purchased and to current BC customers as a Web-only download.

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Topics include:

- [BC product kit](#), page 21
- [BC software update capability](#), page 22
- [Downloading BC software and documentation from the Web](#), page 22

## BC product kit

Individual items in the BC product kit are listed in [Table 5](#). These items can be downloaded from the BC product web site using the procedure in “[Downloading BC software and documentation from the Web](#)” on page 22. See [Appendix A](#) for a complete BC product history.

**Table 5: BC product kit contents**

Component	Format	Description
BC server software	One CD-ROM	Software for installing the BC server on an SMA or Storage Management Server (SMS).
BC host agent software	One CD-ROM	Software for installing the BC host agent on a supported host computer.
BC documentation	CD-ROM with technical documents as portable data format (PDF) files and OS-specific BC Online Help & User Guide files in HyperText Markup Language (HTML) format	<p>BC documents consisting of:</p> <ul style="list-style-type: none"> <li>■ Read Me First</li> <li>■ Getting Started Guide</li> <li>■ Network Administration Guide</li> <li>■ Server Installation Guide</li> <li>■ Server Release Notes</li> <li>■ Host Agent Installation Guides (by OS)</li> <li>■ Host Agent Release Notes (by OS)</li> <li>■ Using BC with Continuous Access EVA and Data Replication Manager Application Notes</li> <li>■ Replication License Key Installation Instructions</li> <li>■ Help &amp; User Guide</li> </ul> <p>The BC Help &amp; User Guide can be viewed without installing BC software. To open the Help &amp; User Guide from a local drive or CD-ROM:</p> <ol style="list-style-type: none"> <li>1. Browse to <code>..\Help\Master</code>.</li> <li>2. Double-click the <code>start.htm</code> file to display the Help &amp; User Guide menu page.</li> <li>3. Click an OS link to continue.</li> </ol>
Java™ Runtime Environment (JRE) server	One CD-ROM	JREserver software, specific to an OS, that BC recommends to properly display and use the BC GUI from supported browsing computers. See " <a href="#">Browser requirements and support</a> " on page 46.

## BC software update capability

BC v2.3 software updates the following BC network environments only: BC v2.1, v2.1a, and v2.2.x.

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**Note:** Refer to the *HP StorageWorks Business Copy EVA/MA/EMA 2.3 Getting Started Guide*<sup>1</sup> (AA–RVHPA–TE) for the BC update process to follow.

---

## Downloading BC software and documentation from the Web

Use the following procedure to download BC software and documentation from the BC product web site:

1. Visit <http://h18000.www1.hp.com/products/storage/software/bizcopyeva/index.html>.
2. Click **software & drivers**.
3. Click **download drivers and software**.
4. Click **Business Copy Upgrade UI v2.3 Med/Doc Kit**.

---

1. Hereafter referred to as BC Getting Started Guide.

5. Click an OS.
6. Click the **download** icon for each download component, as desired.

---

**Note:** The BC server and documentation downloads are identical for all supported OSs. However, BC host agent downloads are unique to an OS or group of OSs.

---

7. From the browser, click **Back** to repeat [step 5](#) and [step 6](#) to download more BC host agent software files for BC networks with multiple OSs.

---

**Tip:** HP recommends making a backup of the downloaded files for ease of use and future reference.

---

## What other products perform BC replication?

Table 6 lists other StorageWorks products and interfaces that can be used to perform BC replication.

**Table 6: Other products that perform BC replication**

Array type and product	Interface	Remarks
<b>EVA arrays</b>		
Command View EVA	Browser-based GUI	<ul style="list-style-type: none"> <li>■ Creates snapshots and snapclones from a GUI.</li> <li>■ Replicates by specifying an array and virtual disk; cannot replicate by specifying a host and host volume.</li> <li>■ Cannot perform dynamic mounting or interactions with hosts. Does not provide jobs, job templates, or scripting capabilities.</li> </ul>
Storage System Scripting Utility (SSSU)	Host command line	<ul style="list-style-type: none"> <li>■ Creates snapshots and snapclones from a command line or custom script.</li> <li>■ Replicates by specifying an array and virtual disk; cannot replicate by specifying host and host volume.</li> <li>■ Dynamic mounting and host interactions must be accomplished entirely by writing custom scripts.</li> </ul>
<b>MA/EMA arrays</b>		
HSG Element Manager	Browser-based GUI	<ul style="list-style-type: none"> <li>■ Creates snapshots and clones from a GUI.</li> <li>■ Replicates by specifying an array and virtual disk; cannot replicate by specifying a host and host volume.</li> <li>■ Cannot perform dynamic mounting or interactions with hosts. Does not provide jobs, job templates, or scripting capabilities.</li> </ul>
Command Scriptor	Browser-based GUI and host command line	<ul style="list-style-type: none"> <li>■ Creates snapshots and snapclones from a GUI, command line, or custom script.</li> <li>■ Replicates by specifying an array and virtual disk; cannot replicate by specifying host and host volume.</li> <li>■ Dynamic mounting and host interactions must be accomplished entirely by writing custom scripts.</li> </ul>



# Configuration and Update Planning

## 2

This chapter provides information to consider when planning a new BC environment or updating an existing BC environment. To facilitate the planning process, a description of hardware and software components is provided along with sample configuration worksheets. Refer to the BC Getting Started Guide for a list of BC changes from the previous release and [Appendix B](#) for blank worksheets. Use these worksheets to plan each BC environment in the SAN. Topics include:

- [BC environment components](#), page 26
- [Configuration planning](#), page 28
- [Storage systems planning](#), page 31
- [BC server platform planning](#), page 32
- [Host computer planning](#), page 34
- [BC use with Continuous Access EVA and Data Replication Manager](#), page 38
- [Sample configuration worksheets](#), page 39

## BC environment components

A BC environment is often a subset of an existing Fibre Channel SAN. The SAN consists of host computers, StorageWorks storage systems, and switches that are connected by fiber optic cabling. The Fibre Channel carries storage data transmitted between storage systems and host computers.

All host computers in a BC network are also connected by a LAN and communicate with each other through a TCP/IP connection. The LAN carries command and status data transmitted between SAN components.

See “[BC Requirements and Support](#)” on page 41 for details pertaining to supported hardware and software versions for the various components discussed in this section.

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**Note:** BC is compatible with and can be accessed from the HP Systems Insight Manager and HP System Management Homepage. For information on:

- Insight Manager, visit: <http://h18013.www1.hp.com/products/servers/management/hpsim/index.html>
  - System Management Homepage, visit: <http://h18013.www1.hp.com/products/servers/management/agents/description.html>
- 

This section describes the components typically used in a BC environment, which include:

- [Storage systems](#)
- [Storage Managers](#)
- [BC server platforms](#)
- [BC server software](#)
- [BC host agent software](#)

## Storage systems

StorageWorks storage systems provide the storage replicated capacity used during BC replication. Supported storage systems include MA, EMA, and EVA.

## Storage Managers

Storage managers allow storage systems to be managed through a GUI interface, which is accessed through a Web browser. The applicable storage manager depends on the storage system used:

- For EVA: The HP StorageWorks Command View EVA is the storage manager. Install this software on a BC server platform, per supported BC configurations.
- For MA/EMA: The HP StorageWorks HSG Element Manager is the storage manager. This software must be installed on an SMA.

## BC server platforms

BC supports installing the BC server software on the following platforms<sup>1</sup>:

- Storage Management Appliance (SMA)—A proprietary component that provides a flexible means for managing and monitoring SAN elements, including storage arrays. The SMA supports installations of both the BC server and storage manager software versions.
- Storage Management Server (SMS)—A configuration that allows the option to move away from the SMA hardware environment, providing flexibility to use existing computers that might already exist in the SAN. This host configuration must contain both the BC server and a specific Command View EVA software version.

---

**Note:** See [Table 15](#) on page 44 for BC server platform details.

BC *does not* support a host that contains both the BC server and BC host agent software. See [Figure 3](#) on page 18 for an example of BC server platform connections.

---

## BC server software

The BC server controls all BC job activities for a BC environment. The BC server software must be installed on a BC server platform to provide the following:

- An engine for running BC replication jobs.
- BC job creation and job management functions. These features allow the creation, validation, and management of jobs. All BC jobs are stored on the BC server platform.
- BC Jobs, Resources, Logs, Configuration, and Help pages. These pages provide information that help to create and manage jobs, identify available resources, view BC activities, and manage storage system resource availability.
- An HTTP server for BC. The HTTP server allows the use of a Web browser to access all BC features.

A BC environment containing a BC server and associated storage systems can be managed remotely using a Web browser. From the Web browser, simply browse to the BC server platform, log in, and access the BC GUI. See “[Starting and Browsing to BC](#)” on page 63 for browsing information.

## BC host agent software

BC host agent software is installed on a supported host computer to enable BC network functionality and create a BC-enabled host. This software:

- Provides communication between the BC-enabled host and the BC server.
- Performs all activities associated with running BC jobs within the BC network as directed by the BC server.
- Provides a BC command line interface (EVMCL) for creating and running BC jobs.

---

**Note:** BC *does not* support installing BC server and BC host agent software on the same computer.

---

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1. The hardware platform containing the BC server software is called the BC server platform.

## Configuration planning

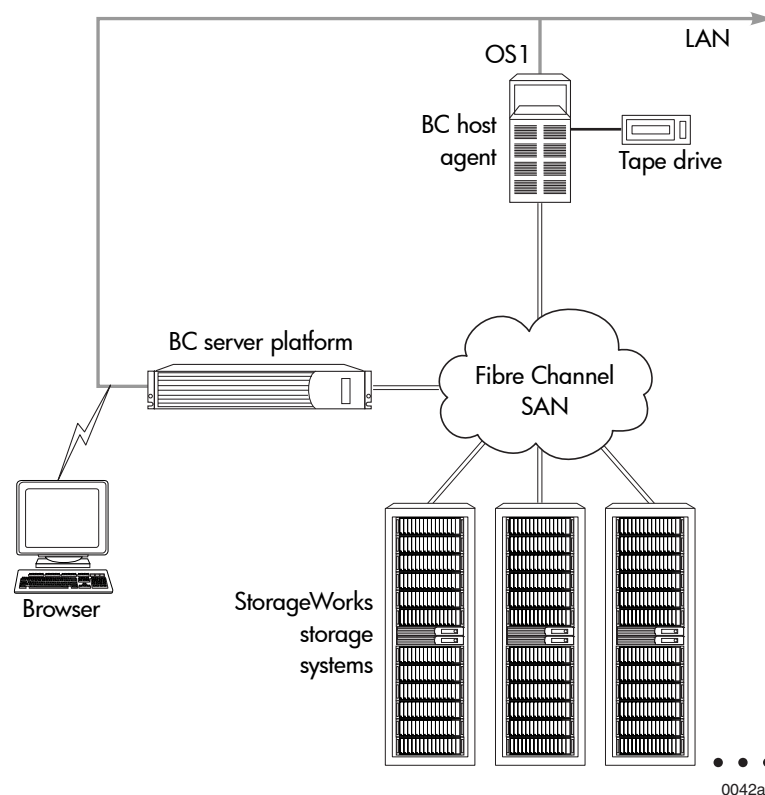
In a SAN, a valid BC environment requires host computers to be connected by Fibre Channel to supported StorageWorks storage systems. BC-enabled hosts are compatible only with multibus failover SAN configurations and switched fabric Fibre Channel environments. For detailed information on supported SAN configurations, refer to the applicable storage system documentation.

The configuration used for each BC environment may be different depending on the purpose of the design. For example, configuration designs might include centralized backup, data warehousing, or application testing. The following configuration examples illustrate possible BC environments:

- [Example 1: BC host agent on one host computer](#), page 28
- [Example 2: BC on multiple host computers](#), page 29
- [Example 3: BC on multiple hosts for high availability](#), page 30

### Example 1: BC host agent on one host computer

The BC environment in [Figure 5](#) is good for providing online storage, near online storage, and tape backups of replicated storage volumes. Only two BC software installations are required to create this configuration: installing the BC server on a BC server platform and the BC host agent on a host computer.

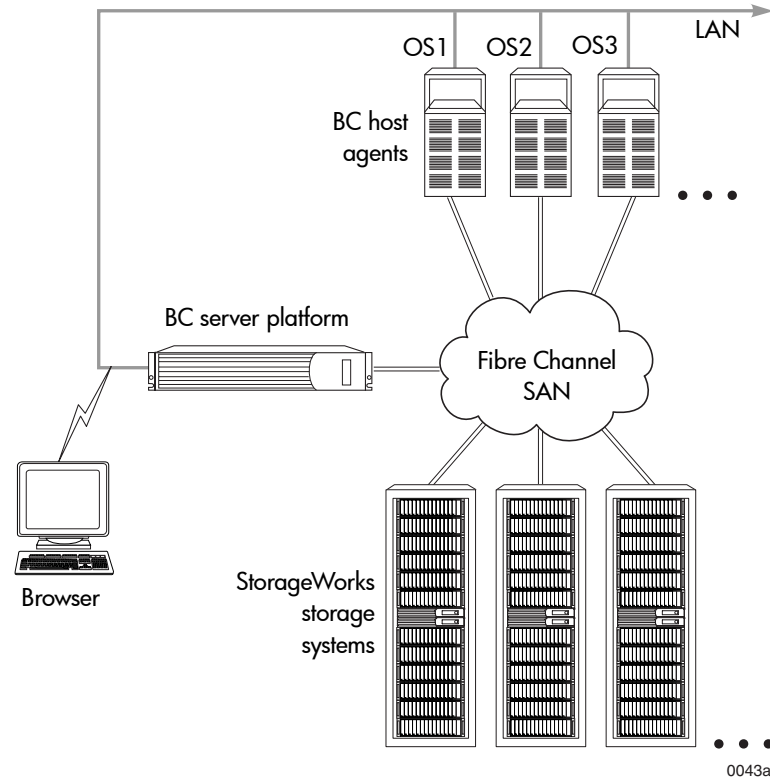


**Figure 5: BC environment with one BC-enabled host computer**

## Example 2: BC on multiple host computers

BC can mount replicated storage volumes on a BC-enabled host computer of the same type of operating system as the source. Theoretically, the number of BC-enabled host computers is unlimited, and any of these hosts can run any supported OS for BC network functionality.

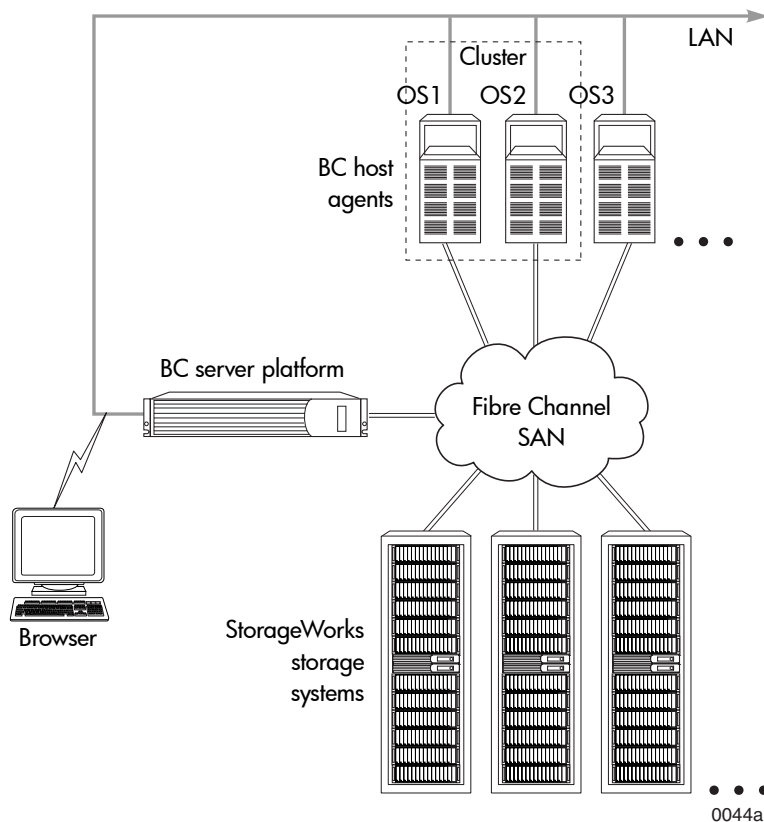
The BC environment in [Figure 6](#) allows for several possible uses. For example, the computer running operating system 2 (OS2) might perform tests on copies of transaction records produced by the application on the computer running OS1. The computer running OS3 could be a dedicated tape backup server that saves daily transactions from the application running on the OS1 computer and also backs up testing results from the computer running OS2.



**Figure 6: BC environment with multiple BC-enabled host computers**

### Example 3: BC on multiple hosts for high availability

The BC environment in [Figure 7](#) illustrates clustering capabilities. The number of clusters in a BC network is unlimited. In this example, the BC-enabled host computers running OS1 and OS2 include a dual-bus fault tolerance configuration using HP StorageWorks Secure Path.



**Figure 7: BC environment with clustering**

## Storage systems planning

A BC environment must include at least one storage system. For the best overall performance, BC environments that contain a BC network should include only the storage systems that are intended for use in BC jobs.

---

**Note:** BC can simultaneously support up to 25 MA/EMA storage systems and up to 16 EVA storage systems. However, as the number of storage systems increases, BC job performance and user-interface responsiveness can degrade. Actual performance depends on several factors, including the number of jobs running, the number of steps and complexity of the jobs, and available resources on the storage systems and hosts.

---

If a BC environment must include storage systems that are *not intended* to be used with BC jobs, deselect these storage systems through the BC GUI **Configuration** tab. Deselecting these storage systems improves BC performance, but *does not limit* the use of these storage systems outside of BC. Refer to the BC Online Help & User Guide for instructions to deselect or select storage systems.

---

**Note:** See [“Best practices”](#) on page 72 regarding BC and storage system usage, and [“Storage system requirements and support”](#) on page 43 for storage system requirements and versions.

---

### MA/EMA storage systems

For MA/EMA storage systems, complete the following:

- Identify the storage systems, if any, to use in the BC environment and obtain the appropriate BC replication license for these systems.
- Ensure that the total number of storage systems that BC supports is not exceeded (a storage manager limitation).
- Ensure that each storage system is controlled by only one supported storage manager.
- Ensure that each array controller uses a supported ACS version and is configured for multibus failover.

### EVA storage systems

For EVA storage systems, complete the following:

- Identify the storage systems, if any, to use in the BC environment and obtain the appropriate BC replication license for these systems.
- Obtain and activate the BC replication license key for each storage system.
- Ensure that the total number of storage systems that BC supports is not exceeded (a storage manager limitation).
- Ensure that each storage system is controlled by only one supported storage manager.
- Ensure that each virtual controller uses a supported VCS version.

## BC server platform planning

A BC environment must include one BC server platform. Possible platforms include:

- SMA—For existing BC networks, the SMA can continue to be used.
- SMS—New platform beginning with BC v2.3.

From the BC server platform, BC accesses only those storage systems that the storage manager controls and presents to the BC GUI.

If a SAN configuration includes more than one supported BC server platform for a planned BC environment, select one BC server platform on which to install the BC server software. Then either remove any other BC server installation from the other BC server platforms within this BC environment, or exclude the additional BC server platforms (zone out these BC server platforms) from the current BC environment.

If an SMS is used as the BC server platform, remove any BC server installation on an SMA in this SAN configuration or zone out the SMA from this BC environment.

---

**Note:** See [“BC server platforms”](#) on page 27 for BC server platform descriptions and [“BC server platform requirements and support”](#) on page 44 for hardware and software requirements. Refer to the BC Getting Started Guide for illustrated, BC-supported configurations.

---

---

**Tip:** BC server software installs on the SMA using an SWP file and on an SMS as a typical Windows application (EXE file). Attempting to use the EXE file to install on the SMA causes the installation to abort. BC server software must be installed on the SMA using the SMA software interface. Refer to the *HP StorageWorks Business Copy EVA/MA/EMA 2.3 Server Installation Guide*<sup>2</sup> (T3032-96202) for installation instructions.

---

The following topics provide information to help clarify specific BC configuration issues:

- [SMA](#)
- [SMS](#)
- [Storage managers](#)

## SMA

If using an SMA as the BC server platform, complete the following:

- Identify the SMA and ensure that the SMA hardware and software versions are supported by BC.
- Ensure that only one SMA exists in the BC environment.
- Ensure that all storage systems are controlled by a supported storage manager installed on the SMA.
- Ensure that the SMA is located on the same LAN as the planned BC-enabled host computers.

---

2. Hereafter referred to as BC Server Installation Guide.



- For new SMAs, consider changing the default SMA name (a serial number) to a user-friendly name.

HP recommends renaming the SMA to an easily recognized name before installing the BC server software. Renaming at this point facilitates easy replacement in the event of an SMA failure. After installing the BC server software on the SMA, renaming involves removing and reinstalling this software. For renaming instructions, see “[Changing the default BC server platform account login password](#)” on page 67.

## SMS

If using an SMS as the BC server platform, complete the following:

- Identify the host computer to use and ensure that the computer hardware and software components meet BC requirements (see “[BC server platform requirements and support](#)” on page 44).
- Ensure that the host computer is located on the same LAN as the planned BC-enabled hosts, or has connectivity and name resolution over a WAN.
- Ensure that all EVA storage systems are controlled by a storage manager installed on this host computer.
- For MA/EMA storage systems, ensure the host computer has network connectivity to an SMA running a supported storage manager.

## Storage managers

The BC server uses storage managers to communicate with supported storage systems. BC recognizes and communicates only with storage systems that are presented by the storage managers to the BC GUI.

For storage managers in a BC environment, complete the following:

- Ensure that each storage manager version is supported by BC.
- Enable the HSG Element Manager remote access feature, if applicable, to allow BC to display HSG storage resources (see “[Establishing storage manager remote access](#)” on page 84).
- Ensure that the storage managers remain running at all times to enable BC to perform storage replication activities.
- Ensure that the BC replication license key is installed for the storage system, if applicable.

---

**Note:** Storage managers preinstalled on the SMA are configured to start automatically during startup. These preinstalled versions might not meet current BC operational requirements (see [Table 15](#) on page 44).

---

## Host computer planning

BC environments can include two kinds of host computers: standard hosts and BC-enabled hosts, as highlighted in [Table 7](#) (see “[What is Business Copy replication?](#)” on page 16 for additional information).

**Note:** BC does not support installing BC server and BC host agent software on the same computer.

**Table 7: BC environment host computer options**

If a host is...	The host...	And requires...
Standard	<i>Does not</i> have BC software installed and can communicate with supported storage managers and the BC server (if used) to replicate storage volumes.	A supported SSSU <sup>1</sup> installed on a supported BC host computer.
BC-enabled	Can communicate with the BC server and perform all activities associated with running BC jobs, including: <ul style="list-style-type: none"> <li>■ Replicating storage volumes by specifying the host name</li> <li>■ Suspending or resuming host I/O in conjunction with replication</li> <li>■ Mounting volumes on the host</li> <li>■ Launching an external job or issuing a host command</li> <li>■ Viewing, discovering, and deleting hosts from the BC GUI</li> </ul>	BC host agent software installed on the host computer to obtain BC network support.

1. See “[Storage system scripting utilities](#)” on page 35 for additional information.

Items to consider when performing host computer planning include:

- [Support of storage systems and host OSs](#)
- [Storage system scripting utilities](#)
- [Host computer FCAs/HBAs and the LAN](#)
- [BC-enabled Windows NT 4.0 host migration](#)

## Support of storage systems and host OSs

BC supports various types of storage systems and several host OSs. See “[Storage system requirements and support](#)” on page 43 and “[BC-enabled host requirements and support](#)” on page 49.

Standard hosts connect to the SAN and *do not* use an instance of BC software, whereas BC-enabled hosts require the BC host agent software. For both host types, BC provides:

- Replication license for storage systems
- BC server software, BC GUI, and a BC command line interface (EVMCL)
- OS-neutral operations that are valid with storage system “unit” syntax

With BC-enabled host support, additional features include:

- BC host agent software for creating BC-enabled hosts, establishing a BC network
- OS-specific replication operations that are valid with BC-enabled host “volume” syntax
- OS-specific operations to mount replicated storage volumes on a BC-enabled host
- OS-specific operations to suspend, resume, and launch BC-enabled host applications

## Storage system scripting utilities

BC environments that use standard hosts need a scripting utility to perform the desired replication of storage volumes unless a BC server is added to this environment. By adding a BC server to this BC environment, the task of BC job creation, maintenance, and scheduling becomes easy through the use of built-in job operations provided by the BC GUI.

**Table 8: HP storage system scripting utilities**

Storage system	Scripting utility	Description
EVA	SSSU	<p>Compatible with Command View EVA.</p> <p>This utility may be used to create custom scripts for EVA storage systems. These scripts provide features and operations similar to those built in to the BC GUI.</p> <p>The SSSU is included in each host OS EVA Platform Kit. The <i>HP StorageWorks Storage System Scripting Utility Enterprise Virtual Array 3.x Reference Guide</i> can be found at:  <a href="http://wwwss1.pro.compaq.com/support/reference_library/viewdocument.asp?source=AA-RU5HC-TE.xml&amp;dt=264">http://wwwss1.pro.compaq.com/support/reference_library/viewdocument.asp?source=AA-RU5HC-TE.xml&amp;dt=264</a>. To obtain this free utility, download the applicable platform kit from the following web site:  <a href="http://h18000.www1.hp.com/products/storageworks/softwaredrivers/enterprise/index.html">http://h18000.www1.hp.com/products/storageworks/softwaredrivers/enterprise/index.html</a>.</p>
MA/EMA	Command Scripter	<p>This utility may be used to create custom scripts for use with MA/EMA storage systems. These scripts provide features and operations similar to those built in to the BC GUI. To download this free utility, visit:  <a href="http://h18004.www1.hp.com/products/sanworks/softwaredrivers/commandscripter/index.html">http://h18004.www1.hp.com/products/sanworks/softwaredrivers/commandscripter/index.html</a>.</p>

## Host computer FCAs/HBAs and the LAN

Planning considerations that pertain to host computer hardware and the LAN in a BC environment include:

- Ensuring that each host computer contains a BC-supported Fibre Channel adapter (FCA), or host bus adapter (HBA), with a supported firmware version.
- Ensuring that each host computer is located on the same LAN as the BC server platform.
- If the BC server and BC-enabled hosts are on different sides of a firewall, the following TCP ports must be manually opened *before* installing the BC server or BC host agent software: 4991, 4992, 4993, 4995.

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**Note:** See “[BC-enabled host requirements and support](#)” on page 49 for hardware and software requirements.

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## BC-enabled Windows NT 4.0 host migration

Beginning with BC v2.3, BC-enabled Windows NT® 4.0 hosts are no longer supported in the BC network. BC environments containing BC-enabled Windows NT hosts should either migrate the hosts to a supported host OS, or at a minimum, uninstall the BC host agent software.



**Caution:** Before uninstalling the BC host agent software from the host computer, if the BC network configuration files are backed up to this host, either save or move the configuration files (`cfg_jobs.bkp` and `cfg_cmn.bkp`) to another BC-enabled host. Failure to perform this task will result in losing the configuration information when the BC host agent software is uninstalled.

---

**Tip:** To prevent network loading and BC server performance degradation, do not leave earlier BC host agent software installed on the Windows NT host.

---

Perform the following tasks to migrate a host containing an OS that is no longer supported:

**Part I: Copy BC network backup configuration files**

1. Determine whether the BC-enabled host contains BC network backup configuration files (current or recent backup files). If the configuration files are:
  - Stored on this host, continue with the next step.
  - Not stored on this host, continue with [step 4](#).
2. Create a current backup to make sure the BC network backup configuration files are current.
3. Back up the configuration files (`cfg_jobs.bkp` and `cfg_cmn.bkp`) to another computer. Perform one of the following tasks:
  - Use the earlier BC GUI to save the configuration to a different BC-enabled host OS in the current BC network.
  - Drag-and-drop the configuration files from this BC-enabled host to another host computer or location (for example: FTP site, floppy disk, mapped drive, and so forth).  
This method is practical when all BC-enabled hosts in a BC network use the unsupported host OS.

Find the earlier BC configuration files in:

`<Program Files>\Compaq\SANworks\Enterprise Volume Manager\bin`

- Add a new BC-enabled host, containing a BC-supported OS, to the BC v2.2 network and then use the BC v2.2 GUI to save the configuration to this host.
4. Perform an undo of any BC jobs that need to be undone for this BC-enabled host.

**Part II: Remove the BC host agent software from the host**

5. Uninstall the BC host agent software from this BC-enabled host.  
Refer to the applicable BC Host Agent IG to remove BC host agent software.

- Decision point:*
6. Determine whether or not to upgrade this host OS to a BC v2.3 supported host OS:
    - Yes, upgrade the host. Make sure to update the BC server and then continue with the next step.
    - No, do not upgrade the host. If the drag-and-drop method was used in [step 2](#), continue with [step 8](#) to identify where to save the configuration file; otherwise, stop here.  
This host can now perform replication using a storage manager or command line.

7. Update the BC software in this BC network to BC v2.3.

Refer to the BC Getting Started Guide for the update process sequence to follow.

See “[BC-enabled host requirements and support](#)” on page 49 for hardware and software requirements for this supported OS.

8. Determine whether or not this new BC-enabled host should store the BC network configuration files:

- Yes; then drag-and-drop the configuration files from the location used in [step 2](#) to the following directory.

For Windows:

`<Program Files>\Hewlett-Packard\Business Copy\bin`

For Linux®:

`/opt/CPQevm/bin`

For OpenVMS:

`SYS$SYSDEVICE:[VMS$COMMON.BC]`

For UNIX®:

`.../usr/opt/CPQevm/bin`

- No; then continue with the next step.

9. If necessary, edit all jobs containing the old unsupported host OS to reflect either:

- The new host OS, or
- The new BC-enabled host designated to perform these job functions.

---

**Note:** If the host name remains the same from the unsupported BC-enabled computer to the upgraded/new BC-enabled computer, editing of BC jobs is not necessary.

---

10. Repeat this procedure for all hosts in the BC environment that are no longer supported.

## BC use with Continuous Access EVA and Data Replication Manager

To use BC in a Continuous Access EVA or DRM environment, refer to the *HP StorageWorks Business Copy EVA/MA/EMA 2.3 Using BC with Continuous Access EVA and Data Replication Manager Application Notes*<sup>3</sup> (T3032–96208) for BC environment planning and requirements.

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3. Hereafter referred to as BC Application Notes, Using BC with Continuous Access EVA and Data Replication Manager.

## Sample configuration worksheets

Table 9, Table 10, and Table 11 illustrate sample worksheets for configuring a new or existing BC environment. Appendix B provides blank worksheets for printing.

**Table 9: Sample worksheet—BC environment components**

Component	Current version	Tasks
Storage systems planned or in use:		
■ EVA: how many __2__	1 EVA3000, 1 EVA5000	Update both systems to VCS v3.020
■ MA: how many __0__	N/A	N/A
■ EMA: how many __3__	1 EMA12000, 2 EMA16000	Update to ACS v8.7-4
Storage managers planned or in use:		
■ HSG Element Manager	v1.0e (installed on SMA)	Update to v1.0f
■ Command View EVA	v3.2 (installed on SMA)	OK. Consider updating to v3.3
BC server planned or in use	v2.2.1 (installed on SMA)	Update to v2.3
SMA planned or in use:		
■ Hardware	SMA II (name: CHICAGO)	Supported by BC
■ Software	v2.0	Update to v2.1
Firewall	No issues	OK

**Table 10: Sample worksheet—Host computers**

Host computer name	OS	FCA/HBA	Platform kit	Secure Path	BC version	Tasks/remarks
1. Colorado_1	Windows 2000	OK	OK	change	v2.2.1	Update to Secure Path v4.0c SP1 Update BC
2. California_1	Tru64 UNIX	change	OK	N/A	v2.2	Update to adapter FCA2354 Update BC
3. Nevada_2	HP-UX	OK	none	none	none	New host computer Install HP-UX MA/EMA Platform Kit for ACS v8.7-4 Install Secure Path v3.0d Install BC host agent software
4. Utah_1	AIX	change	OK	change	v2.2	Update to adapter DS-SWIA1-PD/197819-B21 Update Secure Path to v2.0d SP1 or SP2 Update BC
5. Utah_2	Solaris	change	OK	OK	v2.2	Update FCA2257P driver Update BC

**Table 11: Sample worksheet—Storage systems**

Storage system name	Controller type	ACS/VCS version	Tasks/remarks
1. SUBSYS03	HSG	change	EMA16000: update to ACS v8.7-4
2. SUBSYS04	HSG	change	EMA12000: update to ACS v8.7-4 Reconfigure for multibus failover
3. SUBSYS10	HSG	change	EMA16000: update to ACS v8.7-4
4. system16	HSV	change	EVA3000: update to VCS v3.020
5. system20	HSV	change	EVA5000: update to VCS v3.020



# BC Requirements and Support

## 3

This chapter lists specific requirements and support for configuring components in a BC environment. Topics include:

- [BC environment requirements](#), page 42
- [Storage system requirements and support](#), page 43
- [BC server platform requirements and support](#), page 44
- [Browser requirements and support](#), page 46
- [BC-enabled host requirements and support](#), page 49
- [Cluster limitations and recommendations](#), page 58

## BC environment requirements

Table 12 lists the potential components for a BC environment.

**Table 12: Requirements and support for potential BC environment components**

Component	Requirement
Storage systems	At least one storage system per BC environment with a BC replication license. Each storage system can interact with only one BC server.
Storage managers	<ul style="list-style-type: none"> <li>■ For EVA storage systems: one Command View EVA installed on a supported BC server platform.</li> <li>■ For MA/EMA storage systems: one HSG Element Manager installed on an SMA.</li> </ul>
BC server platform	Either an SMA or SMS where the BC server software is installed.
BC server software	<ul style="list-style-type: none"> <li>■ Only one installation per BC environment on a BC server platform.</li> <li>■ Required for BC network functionality.</li> </ul>
Browser/JRE combination	At least one supported browsing computer and JRE combination to access the BC GUI.
BC host agent software	Required for BC networks, installed on at least one BC-supported OS host computer.
Component	Supported
Firewall	If the BC server and BC-enabled hosts are on different sides of a firewall, the following ports must be manually opened before installing the BC server or BC host agent software: 4991, 4992, 4993, and 4995.

## Storage system requirements and support

Table 13 and Table 14 list storage system requirements and support.

**Table 13: MA/EMA storage system requirements**

Component	Required	Remarks
Models	MA8000, EMA12000, or EMA16000	Storage arrays
ACS	v8.7x-4 (minimum) or v8.8x (x = F, S, or P)	F = clone replication only S = clone and snapshot replication only P = clone and snapshot replication with DRM capability
Controllers	<ul style="list-style-type: none"> <li>■ Dual controllers configured for multibus failover</li> <li>■ Only HSG80 controllers are supported</li> </ul>	Transparent failover is <i>not</i> supported by BC.
Cached memory	Each controller: <ul style="list-style-type: none"> <li>■ Any cache configuration provides clone functionality</li> <li>■ 512 MB for snapshot functionality</li> </ul>	Memory must be mirrored. Adding memory is optional.
SAN connections	To the BC server platform and all host computers	Fibre Channel
SAN topology	Fibre Channel switched fabric	To BC server platform and all host computers
Component	Supported	Not supported
Maximum number of storage systems	25	
StorageWorks Command Console (SWCC)		SWCC managed storage cannot be included in a BC network. BC does not allow an SWCC HS-Series agent to access the same storage systems as a BC-enabled host.

**Table 14: EVA storage system requirements**

Component	Required	Remarks
Models	EVA3000 and/or EVA5000	Virtual arrays
VCS	v3.014 or v3.020	VCS Supported software that provides snapclone and snapshot replication with Continuous Access EVA capability
Controllers	<ul style="list-style-type: none"> <li>■ Dual controllers configured for multibus failover</li> <li>■ Each controller pair must be the same type (HSV100 or HSV110)</li> </ul>	
SAN Connections	To the BC server platform and all host computers	Fibre Channel
SAN Topology	Fibre Channel switched fabric	To BC server platform and all host computers
Component	Supported	Not supported
Maximum Number of Storage Systems	16	

## BC server platform requirements and support

Table 15 lists BC server platform requirements and support.

**Note:** The BC server software must be installed on a BC server platform (see “[BC server platform planning](#)” on page 32 for planning guidelines).

**Table 15: BC server platform requirements and support**

Component	Required	Remarks
BC server platform	<p>The BC server software must be installed on an SMA or SMS. The required configuration depends on the following factors:</p> <ul style="list-style-type: none"> <li>■ Storage system</li> <li>■ Storage manager</li> </ul> <p>Specific requirements:</p> <ul style="list-style-type: none"> <li>■ SMA II or III running SMA software v2.1, or</li> <li>■ SMS<sup>1</sup></li> </ul> <p>The SMS language parameter must be set to “English (United States)” during BC server software installation.</p>	<p>Table 16, Table 17, and Table 18 provide specific BC server platform configuration requirements and support as defined by the storage systems used in a BC environment.</p> <p>The supported SMS platform at this time is only a Microsoft Windows Server 2003 Enterprise Edition (32-bit) host. <i>The 64-bit version is not supported.</i></p>
Storage manager	<ul style="list-style-type: none"> <li>■ For EVA: <ul style="list-style-type: none"> <li>— Command View EVA v3.1, v3.2, or v3.3 running on an SMA, or</li> <li>— Command View EVA v3.3 running on an SMS</li> </ul> </li> <li>■ For MA/EMA: HSG Element Manager v1.0f running on an SMA</li> </ul>	<p>A storage manager is required for each storage system type in the BC environment.</p> <p>The storage manager installation location depends on the BC server platform configuration chosen for each BC environment.</p> <hr/> <p><b>Note:</b> BC supports Command View EVA v3.1 with VCS v3.014 only.</p>
BC server software	<ul style="list-style-type: none"> <li>■ Only one instance per BC environment installed on the BC server platform</li> <li>■ Each storage system can interact with only one BC server platform</li> </ul>	<p>Installs on the SMA through the SMA software interface only, using an SWP file.</p> <p>Installs on an SMS as a typical Windows installation using an EXE file.</p> <p>Contact an HP authorized service provider or reseller for BC replication licensing details.</p>
SAN connection	To the BC server platform, all BC-enabled hosts, and all storage systems in the BC environment	Fibre Channel
LAN connection	To the BC server platform and all BC-enabled hosts	Compatible LAN adapter
Browsing computer	At least one browsing computer connected to the LAN	To access BC GUI for management activities. See “ <a href="#">Browser requirements and support</a> ” on page 46 and “ <a href="#">Browsing to the BC GUI</a> ” on page 68.

1. The SMS must contain specific hardware and software to function as a BC server platform. Refer to the Command View EVA v3.3 software documentation for configuration details.

Table 16 provides the supported BC server platform configuration exclusively for MA/EMA storage systems.

**Table 16: MA/EMA storage system only—BC server platform configuration requirements and support**

Storage configuration		BC components and software installed	
		SMA	SMS
M1	MA/EMA only	<ul style="list-style-type: none"> <li>■ SMA II or III running SMA software v2.1</li> <li>■ BC server</li> <li>■ HSG Element Manager v1.0f</li> </ul>	

Table 17 provides the supported BC server platform configurations exclusively for EVA storage systems.

**Table 17: EVA storage system only—BC server platform configuration requirements and support**

Storage configuration		BC components and software installed	
		SMA	SMS
E1	EVA only	<ul style="list-style-type: none"> <li>■ SMA II or III running SMA software v2.1</li> <li>■ BC server</li> <li>■ Command View EVA v3.1, v3.2, or v3.3</li> </ul>	
E2			<ul style="list-style-type: none"> <li>■ Windows Server 2003 Enterprise Edition (32-bit) host</li> <li>■ BC server</li> <li>■ Command View EVA v3.3</li> </ul>

Table 18 provides the supported BC server platform configurations for MA/EMA and EVA storage system combinations.

**Table 18: MA/EMA and EVA storage system combinations—BC server platform configuration requirements and support**

Storage configuration		BC components and software installed	
		SMA	SMS
ME1	MA/EMA and EVA	<ul style="list-style-type: none"> <li>■ SMA II or III running SMA software v2.1</li> <li>■ BC server</li> <li>■ HSG Element Manager v1.0f</li> <li>■ Command View EVA v3.1, v3.2, or v3.3</li> </ul>	
ME2		<ul style="list-style-type: none"> <li>■ SMA II or III running SMA software v2.1</li> <li>■ HSG Element Manager v1.0f</li> </ul>	<ul style="list-style-type: none"> <li>■ Windows Server 2003 Enterprise Edition (32-bit) host</li> <li>■ BC server</li> <li>■ Command View EVA v3.3</li> </ul>

## Browser requirements and support

Any supported browsing computer with a valid network connection can browse to the BC server platform, but a valid login is required to access the BC GUI.

Because the BC GUI uses Java applets, the browsing computer must use a browser and JRE combination. When browsing to the BC GUI, if a JRE for the browsing computer OS:

- Is installed, then the BC GUI displays.
- Is not currently installed, BC displays a message prompting you to install a minimum supported. If JREserver:
  - Was installed from the JREserver CD to the BC server platform, the JRE can be downloaded directly from the BC server platform.

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**Note:** Refer to the *HP StorageWorks JREserver 1.0 Installation Guide*<sup>1</sup> (AA-RVHQA-TE) for instructions on installing JREserver.

The JREs provided by the JREserver utility were tested with Business Copy and Continuous Access management software. HP supports these JREs and any patches distributed by the JRE developer to address issues such as security vulnerabilities. HP recommends that customers contact the JRE manufacturer to determine if any patches are required.

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- Was not installed, BC provides a table of OS pointers for downloading the minimum supported JRE from the Web.

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**Note:** At the time of this BC product release, the URLs listed in the table of OS pointers were valid for obtaining specified JREs from the Web.

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Table 19 identifies the supported browsing computer OSs and the browser and JRE version requirements for each. After successfully installing the OS-specific JRE, BC allows this browsing computer to access the BC GUI. In some cases, the browsing computer might require a reboot following the JRE installation.

Table 19 content is available online using the following URL format and clicking **Internet-Download Installation**:

`https://<BC_server_platform_name2 or IP_address>:2381/business_copy/html/jremethods.html`

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**Note:** HP does not recommend installing JRE software on the BC server platform. Performing “local browsing” to the BC GUI can result in a JRE conflict and a possible loss of BC functionality.

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**Note:** Ensure that only a supported JRE version is installed on the browsing computer; multiple versions of the JRE can cause problems while viewing the BC GUI.

For best viewing results, HP recommends browsing from a supported version of Microsoft Internet Explorer (IE) with a supported JRE for optimal viewing and performance.

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1. Hereafter referred to as JREserver Installation Guide.
  2. Use a fully qualified name (such as MyComputer.dept.com) or unqualified name (such as MyComputer), depending on network configurations and proxies.

**Note:** BC no longer supports the following:

- Netscape browsers
- Browsing from OpenVMS, Tru64 UNIX, IBM AIX, Sun Solaris, Windows NT, and Windows 2000 Datacenter computers

**Table 19: Browsing computer OS, browser, and JRE combination requirements and support**

Supported browsing computer OS	Required browser	Minimum supported JRE	Comments
HP-UX 11i v11 (64-bit)	Mozilla 1.4.00.01 from HP	1.4.2_00 from HP	JRE for Precision Architecture: Reduced Instruction Set Computing (PA-RISC)
HP-UX 11i v23 (64-bit)	Mozilla 1.4.00.01 from HP	1.4.2_03 from HP	RTE and JPI for Itanium® Processor Family (IA/IPF)
Red Hat Enterprise Linux AS 2.1 (32-bit)	Mozilla 1.6 from Mozilla	1.4.2_02 (32-bit) from Sun	
Red Hat Enterprise Linux AS 3.0 (32-bit)			
SUSE/UnitedLinux 1.0/SLES 8, (32-bit)			
Red Hat Enterprise Linux AS 2.1 (64-bit)		1.4.2_02 (64-bit) from Sun, which is not available at this time	
Red Hat Enterprise Linux AS 3.0 (64-bit)			
SUSE/UnitedLinux 1.0/SLES 8, (64-bit)			
Solaris 8	Mozilla 1.2.1 from Sun	1.4.2_02 from Sun (32-bit)	
Solaris 9 (64-bit)		1.4.2_02 from Sun (64-bit)	
Microsoft Windows 2000 Server, SP4	IE 6.0.2800.1106 (128-bit) from Microsoft	1.4.2_02 from Sun (32-bit)	For browsing only
Windows 2000 Advanced Server, SP4			
Windows 2000 Professional			
Windows XP Professional			
Windows Server 2003 Enterprise Edition, SP1 (32-bit)	IE 6.0.3790.0000 (SP1) from Microsoft	1.4.2_02 from Sun (64-bit), which is not available at this time	
Windows Server 2003 Enterprise Edition, SP1 (64-bit)			
Windows Server 2003 Datacenter Edition, SP1 (64-bit)			

Other browser related topics include:

- [Recommended browser settings](#)
- [Maximum number of simultaneous browser connections](#)
- [Browsing from Windows Server 2003](#)

## **Recommended browser settings**

To make BC menus fully viewable and accessible for input, HP recommends establishing the following settings:

- A minimum display resolution of 1024 x 768 pixels, with 256 or more colors
- Browser displayed at full screen size

## **Maximum number of simultaneous browser connections**

BC supports up to 16 simultaneous browser sessions to the BC GUI. Increases beyond this number can lead to excessive BC server platform memory usage that decreases overall GUI responsiveness.

## **Browsing from Windows Server 2003**

The BC GUI uses Java applets to display information. This use of Java requires that a JRE be installed on the host that is being used to view the GUI. Currently, a JRE is not available for Windows 64-bit versions; therefore, a Window Server 2003 64-bit system cannot be used for browsing to BC. This limitation does not affect the functionality of the BC host agent software, so a Windows Server 2003 64-bit system can be used as a BC-enabled host.



## BC-enabled host requirements and support

This section specifies required and supported BC-enabled host components for each supported host OS, plus compatible third-party applications. Contact an HP authorized service provider or reseller for server licensing details. Topics include:

- [HP-UX host requirements and support](#), page 49
- [OpenVMS host requirements and support](#), page 50
- [Tru64 UNIX host requirements and support](#), page 51
- [AIX host requirements and support](#), page 52
- [Linux host requirements and support](#), page 53
- [Solaris host requirements and support](#), page 54
- [Windows 2000 host requirements and support](#), page 55
- [Windows Server 2003 host requirements and support](#), page 56
- [Third-party applications](#), page 57

## HP-UX host requirements and support

[Table 20](#) specifies the required and supported components for establishing BC-enabled HP-UX hosts.

**Table 20: HP-UX host requirements and support**

Component	Required	
Operating system	<ul style="list-style-type: none"> <li>■ HP-UX 11i v1 (PA-RISC), or</li> <li>■ HP-UX 11i v2 (IPF)</li> </ul>	
SAN connection FCA or HBA (Two or more FCAs and HBAs must be running with Secure Path)	Any of the following HP PCI Tachlite Adapters: <ul style="list-style-type: none"> <li>■ HP-UX 11i v1 only: A5158A or A6795A with 11.11.09 firmware and the latest driver</li> <li>■ A6826A with 1.34 firmware and the latest driver</li> </ul>	
LAN connection	Compatible LAN adapter	
MA/EMA platform kit	An HP-UX platform kit that supports ACS v8.7x-4 (minimum) or v8.8x <sup>1</sup>	
EVA platform kit	An HP-UX platform kit that supports VCS v3.014 or v3.020	
Secure Path	v3.0d	
Component	Supported	Not supported
File system	<ul style="list-style-type: none"> <li>■ High-Performance File System (HFS)</li> <li>■ VERITAS File System (VxVX)</li> </ul>	
Logical Volume Manager (LVM)	LVM on HP-UX	Any version of VERITAS Volume Manager (VxVM) for HP-UX
Cluster	Not cluster-aware, but can co-exist in a host clustered environment using HP Serviceguard for HP-UX 11i v1 or 11i v2.	<ul style="list-style-type: none"> <li>■ Metro Cluster</li> <li>■ Continental Cluster</li> </ul>
Language support	To use BC-enabled hosts with UNIX operating systems in non-English environments, set "LANG=C; export LANG" in the root profile.	

1. x = F, S, or P software version. See [Table 13](#) on page 43 for version definitions.

## OpenVMS host requirements and support

Table 21 specifies required and supported components for establishing BC-enabled OpenVMS hosts.

**Table 21: OpenVMS host requirements and support**

Component	Required	
Operating system	<ul style="list-style-type: none"> <li>■ OpenVMS v7.3-1, or</li> <li>■ OpenVMS v7.3-2</li> </ul>	
SAN connection FCA or HBA	Any of the following adapters: <ul style="list-style-type: none"> <li>■ DS-KGPSA-CA (LP8000) with 3.82a1 firmware and FIBRE_SCSI_V0400 driver</li> <li>■ FCA2354 (LP9002) with 3.82a1 firmware and FIBRE_SCSI_V0400 driver</li> <li>■ FCA2384 (LP9802) with 1.00x6 firmware and FIBRE_SCSI_V0400 driver</li> <li>■ FCA2684 (LP10000) with 1.81a5 firmware and FIBRE_SCSI_V0400 driver</li> <li>■ FCA2684DC (LP10000DC) with 1.81a5 firmware and FIBRE_SCSI_V0400 driver</li> </ul>	
LAN connection	Compatible LAN adapter	
MA/EMA platform kit	An OpenVMS platform kit that supports ACS v8.7x-4 (minimum) or v8.8x <sup>1</sup>	
EVA platform kit	An OpenVMS platform kit that supports VCS v3.014 or v3.020	
Secure Path	Not applicable	
TCP/IP	v5.1 or later	
Component	Supported	Not supported
File system	Files-11 ODS-2	
LVM		X
Cluster	Cluster-aware using HP OpenVMS Cluster Systems. See " <a href="#">OpenVMS clusters</a> " on page 58 for cluster limitations and recommendations.	

1. x = F, S, or P software version. See Table 13 on page 43 for version definitions.

## Tru64 UNIX host requirements and support

Table 22 specifies the required and supported components for establishing BC-enabled Tru64 UNIX hosts.

**Table 22: Tru64 UNIX host requirements and support**

Component	Required	
Operating system	Tru64 UNIX v5.1b, PK3	
SAN connection FCA or HBA	Any of the following adapters: <ul style="list-style-type: none"> <li>■ DS-KGPSA-CA (LP8000) with 3.82a1 firmware and 2.10 driver</li> <li>■ FCA2354 (LP9002) with 3.82a1 firmware and 2.10 driver</li> <li>■ FCA2384 (LP9802) with 1.00a2 firmware and 2.10 driver</li> <li>■ FCA2684 (LP10000) with 1.81a5 firmware and 2.10 driver</li> <li>■ FCA2684DC (LP10000DC) with 1.81a5 firmware and 2.10 driver</li> </ul>	
LAN connection	Compatible LAN adapter	
MA/EMA platform kit	A Tru64 UNIX platform kit that supports ACS v8.7x-4 (minimum) or v8.8x <sup>1</sup>	
EVA platform kit	A Tru64 UNIX platform kit that supports VCS v3.014 or v3.020	
Secure Path	Not applicable	
Component	Supported	Not supported
File system	<ul style="list-style-type: none"> <li>■ AdvFS</li> <li>■ UFS</li> </ul>	
LVM	Logical Storage Manager (LSM) with AdvFS	LSM with UFS or raw
Cluster	Cluster-aware using TruCluster for Tru64 UNIX v5.1b. See <a href="#">"Tru64 UNIX clusters"</a> on page 59 for cluster limitations and recommendations.	
Language support	To use BC-enabled hosts with UNIX operating systems in non-English environments, set "LANG=C; export LANG" in the root profile.	

1. x = F, S, or P software version. See Table 13 on page 43 for version definitions.

## AIX host requirements and support

Table 23 specifies the required and supported components for establishing BC-enabled AIX hosts.

**Table 23: AIX host requirements and support**

Component	Required	
Operating system	<ul style="list-style-type: none"> <li>■ AIX 5.1.0.75, or</li> <li>■ AIX 5.2.0.10</li> </ul>	
SAN connection FCA or HBA (Two or more FCAs and HBAs must be running with Secure Path)	Any of the following adapters with firmware and driver versions per Secure Path support: <ul style="list-style-type: none"> <li>■ DS-SWIA1-PD/197819-B21 (PC1000)</li> <li>■ PC2000LC (Cambex reseller)</li> </ul>	
LAN connection	Compatible LAN adapter	
MA/EMA platform kit	An AIX platform kit that supports ACS v8.7x-4 (minimum) or v8.8x <sup>1</sup>	
EVA platform kit	An AIX platform kit that supports VCS v3.014 or v3.020	
Secure Path	<ul style="list-style-type: none"> <li>■ v2.0d SP1 supports 2.01.38 firmware and 1.5.24.1 driver</li> <li>■ v2.0d SP2 (recommended) supports 2.02.06 firmware and 1.5.25.3 driver</li> </ul>	
Component	Supported	Not supported
File system	AIX Journaled File System (JFS)	
LVM	LVM on AIX	
Cluster		X
Language support	To use BC-enabled hosts with UNIX operating systems in non-English environments, set "LANG=C; export LANG" in the root profile.	

1. x = F, S, or P software version. See Table 13 on page 43 for version definitions.

## Linux host requirements and support

Table 24 specifies required and supported components for establishing BC-enabled Linux hosts.

**Table 24: Linux host requirements and support**

Component	Required	
Operating system	<ul style="list-style-type: none"> <li>Red Hat Enterprise Linux AS 2.1, U3 and U4 (32- or 64-bit), kernel version 2.4.9-e.39 SMP,</li> <li>Red Hat Enterprise Linux AS 3, U1 and U2 (32- or 64-bit), or</li> <li>SUSE Linux Enterprise Server 8 (SLES8)/UnitedLinux Version 1.0, SP3 (32- or 64-bit)</li> </ul>	
Software library	<p>A standard C++ library is a prerequisite to installing the BC host agent software. The library is not part of the default Linux OS installation. Install the applicable library from the Linux OS installation CD for this host.</p> <hr/> <p><b>Note:</b> Linux BC-enabled host daemons do not automatically start unless the standard C++ library is installed on the host. Installing the library after the BC host agent software requires a manual restart of the daemons.</p> <hr/>	
SAN connection FCA or HBA	<p>Any of the following adapters:</p> <ul style="list-style-type: none"> <li>A6826A (QLA2342) 64-bit only, with 1.34 firmware and 7.00.03 driver</li> <li>FCA2214 (QLA2340) 32-bit only, with 1.34 firmware and 7.00.03 driver</li> <li>FCA2214DC (QLA2342) 32-bit only, with 1.34 firmware and 7.00.03 driver</li> <li>BL20p Mezzanine (Blade) with 1.34 firmware and 7.00.03 driver</li> </ul>	
LAN connection	Compatible LAN adapter	
MA/EMA platform kit	A Linux platform kit that supports ACS v8.7x-4 (minimum) or v8.8x <sup>1</sup>	
EVA platform kit	A Linux platform kit that supports VCS v3.014 or v3.020	
Secure Path	Not supported	
Multipathing support	Qlogic 7.00.03 FO	
Component	Supported	Not supported
Multipathing <sup>2</sup>	<ul style="list-style-type: none"> <li>EVA: Qlogic failover driver (requires multipath HBA setup)</li> <li>MA/EMA: single path configurations only (requires single path HBA setup)</li> </ul>	Secure Path
File system	<ul style="list-style-type: none"> <li>ext2</li> <li>ext3</li> </ul>	
LVM	Sistina LVM v1.0.7 on Linux	
Cluster	Not cluster-aware, but can co-exist in a host clustered environment using HP Serviceguard for Linux	LifeKeeper for Linux
Language support	To use BC-enabled hosts with Linux operating systems in non-English environments, set "LANG=C; export LANG" in the root profile.	

1. x = F, S, or P software version. See Table 13 on page 43 for version definitions.

2. Do not mix EVA and MA/EMA storage system access using the same Linux host. Because of hardware requirements, each Linux host only supports one storage system type: EVA or MA/EMA.

## Solaris host requirements and support

Table 25 specifies the required and supported components for establishing BC-enabled Solaris hosts.

**Table 25: Solaris host requirements and support**

Component	Required	
Operating system	<ul style="list-style-type: none"> <li>■ Solaris 8 (32- or 64-bit), or</li> <li>■ Solaris 9 (32- or 64-bit)</li> </ul>	
SAN connection FCA or HBA (Two or more FCAs and HBAs must be running with Secure Path)	Any of the following adapters: <ul style="list-style-type: none"> <li>■ Solaris 8-only adapters:               <ul style="list-style-type: none"> <li>— SWSA4-SB (FCI-1063) 32-bit PCI, with 3.0.3 firmware and 2.5.9-03 driver</li> <li>— SWSA4-SC (FC64-1063) 64-bit SBus, with 13.3.7 firmware and 2.5.9-03 driver</li> </ul> </li> <li>■ Solaris 8 and 9 adapters:               <ul style="list-style-type: none"> <li>— FCA2257C (QLA2202) cPCI, with 1.18.5 firmware and 3.1.2/4.11 driver</li> <li>— FCA2257P (QLA2310) PCI, with 1.18.5 firmware and 3.1.2/4.11 driver</li> <li>— FCA2257S (QLA2202) Sbus, with 1.18.4 firmware and 2.2.1/4.11 driver</li> <li>— LP9002 with 3.91a3 firmware and 6.01c driver</li> </ul> </li> </ul>	
LAN connection	Compatible LAN adapter	
MA/EMA platform kit	A Solaris platform kit that supports ACS v8.7x-4 (minimum) or v8.8x <sup>1</sup>	
EVA platform kit	A Solaris platform kit that supports VCS v3.014 or v3.020	
Secure Path	<ul style="list-style-type: none"> <li>■ v3.0c SP1, or</li> <li>■ v3.0d (recommended)</li> </ul>	
/var/adm/ messages file	During initial startup following the BC host agent software installation, the BC-enabled Solaris host requires information about the storage and hardware configuration, some of which can be found only in the /var/adm/ messages file.	
Component	Supported	Not supported
File system	UFS, VxVm, and VxFS	
LVM	VxVM 3.5 for Solaris	
Cluster		X
Language support	To use BC-enabled hosts with UNIX operating systems in non-English environments, set "LANG=C; export LANG" in the root profile.	

1. x = F, S, or P software version. See Table 13 on page 43 for version definitions.

## Windows 2000 host requirements and support

Table 26 specifies the required and supported components for establishing BC-enabled Windows 2000 hosts.

**Table 26: Windows 2000 host requirements and support**

Component	Required	
Operating system	Windows 2000 Advanced Server SP4	
SAN connection FCA or HBA (Two or more FCAs and HBAs must be running with Secure Path)	Any of the following SCSIport adapters: <ul style="list-style-type: none"> <li>■ A7387A (LP1050DC) with 1.81a3 firmware and 5-5.10.a9 driver</li> <li>■ A7388A (LP1050) with 1.81a3 firmware and 5-5.10.a9 driver</li> <li>■ DS-KGPSA-CB (LP8000) with 3.92a2 firmware and 5-5.10a9 driver</li> <li>■ FCA2101 (LP952) with 3.92a2 firmware and 5-5.10a9 driver</li> <li>■ FCA2214 (QLA2340) with 1.34 firmware and 9.00.13 driver</li> <li>■ FCA2214DC (QLA2342) with 1.34 firmware and 9.00.13 drive</li> <li>■ FCA2355 (LP9002DC) with 3.92a2 firmware and 5-5.10a9 driver</li> <li>■ FCA2404 (LP9802) with 1.81a2 firmware and 5-5.10a9 driver</li> <li>■ FCA2404DC (LP9802DC) with 1.81a2 firmware and 5-5.10a9 driver</li> <li>■ FCA2408 (LP982) with 1.81a2 firmware and 5-5.10a9 driver</li> </ul>	
LAN connection	Compatible LAN adapter	
MA/EMA platform kit	A Windows platform kit that supports ACS v8.7x-4 (minimum) or v8.8x <sup>1</sup>	
EVA platform kit	A Windows platform kit that supports VCS v3.014 or v3.020	
Secure Path	v4.0c SP1	
DButil scripts	HP database utility used by BC when replicating a Microsoft SQL Server 2000 database. Refer to the <i>HP StorageWorks Business Copy EVA, Using Microsoft SQL Server with DButil Application Notes</i> (AA-RVHRA-TE) for additional information. This document is available on the BC product web site.	
Component	Supported	Not supported
File system	NTFS	
LVM		X
Cluster	Not cluster-aware, but supported on host clusters using Microsoft Cluster Service (MSCS) for Windows 2000 Advanced Server. See " <a href="#">Windows 2000/Windows Server 2003 clusters</a> " on page 59 for cluster limitations and recommendations.	
Language support	To use BC-enabled hosts with Windows operating systems in non-English environments, set "LANG=C; export LANG" in the root profile.	

1. x = F, S, or P software version. See Table 13 on page 43 for version definitions.

## Windows Server 2003 host requirements and support

Table 27 specifies the required and supported components for establishing BC-enabled Windows Server 2003 hosts.

**Table 27: Windows Server 2003 host requirements and support**

Component	Required
Operating system	<ul style="list-style-type: none"> <li>■ Windows Server 2003 Enterprise Edition (32- or 64-bit), or</li> <li>■ Windows Server 2003 Datacenter Edition (64-bit only)</li> </ul>
SAN connection FCA or HBA (Two or more FCAs and HBAs must be running with Secure Path)	<p>Any of the following 32-bit adapters:</p> <ul style="list-style-type: none"> <li>■ A7387A (LP1050DC) or A7388A (LP1050) with:               <ul style="list-style-type: none"> <li>— SCSIport: 1.81a3 firmware and 5-5.10.a9 driver</li> <li>— Storport: 1.81a3 firmware and 5-1.02.a3 driver</li> </ul> </li> <li>■ DS-KGPSA-CB (LP8000) with:               <ul style="list-style-type: none"> <li>— SCSIport: 3.92a2 firmware and 5-5.10a9 driver</li> <li>— Storport: 3.92a2 firmware and 5-1.02.a3 driver</li> </ul> </li> <li>■ FCA2101 (LP952) with:               <ul style="list-style-type: none"> <li>— SCSIport: 3.92a2 firmware and 5-5.10a9 driver</li> <li>— Storport: 3.92a2 firmware and 5-1.02.a3 driver</li> </ul> </li> <li>■ FCA2214 (QLA2340) or FCA2214DC (QLA2342) with:               <ul style="list-style-type: none"> <li>— SCSIport: 1.34 firmware and 9.00.13 driver</li> <li>— Storport: 1.34 firmware and 9.00.18 driver</li> </ul> </li> <li>■ FCA2355 (LP9002DC) with:               <ul style="list-style-type: none"> <li>— SCSIport: 3.92a2 firmware and 5-5.10a9 driver</li> <li>— Storport: 3.92a2 firmware and 5-1.02.a3 driver</li> </ul> </li> <li>■ FCA2404 (LP9802) or FCA2404DC (LP9802DC) with:               <ul style="list-style-type: none"> <li>— SCSIport: 1.81a2 firmware and 5-5.10a9 driver</li> <li>— Storport: 1.81a2 firmware and 5-1.02.a3 driver</li> </ul> </li> <li>■ FCA2408 (LP982) with:               <ul style="list-style-type: none"> <li>— SCSIport: 1.81a2 firmware and 5-5.10a9 driver</li> <li>— Storport: 1.81a2 firmware and 5-1.02.a3 driver</li> </ul> </li> </ul> <p>Any of the following 64-bit adapters:</p> <ul style="list-style-type: none"> <li>■ AB232A (LP9802) or A7298A (LP982) with:               <ul style="list-style-type: none"> <li>— SCSIport: 1.81a2 firmware and 6-5.10a9 driver</li> <li>— Storport: 1.81a2 firmware and 6-1.02a3 driver</li> </ul> </li> </ul>
LAN connection	Compatible LAN adapter
MA/EMA platform kit	A Windows platform kit that supports ACS v8.7x-4 (minimum) or v8.8x <sup>1</sup>
EVA platform kit	A Windows platform kit that supports VCS v3.014 or v3.020
Secure Path	v4.0c SP1



**Table 27: Windows Server 2003 host requirements and support (continued)**

Component	Supported	Not supported
File system	NTFS	
LVM		X
Cluster	<p>Not cluster-aware, but supported on host clusters using:</p> <ul style="list-style-type: none"> <li>■ Enterprise Edition OS: MSCS for Windows Server 2003, Enterprise Edition (32- or 64-bit)</li> <li>■ Datacenter Edition OS: MSCS for Windows Server 2003, Datacenter Edition (64-bit only)</li> </ul> <p>See “<a href="#">Windows 2000/Windows Server 2003 clusters</a>” on page 59 for cluster limitations and recommendations.</p>	
Language support	To use BC-enabled hosts with Windows operating systems in non-English environments, set “LANG=C; export LANG” in the root profile.	

1. x = F, S, or P software version. See Table 13 on page 43 for version definitions.

## Third-party applications

BC is compatible with a variety of third-party applications, including tape backup and database applications. Visit the following URLs for more information:

- Tape compatibility and tools: <http://h18000.www1.hp.com/products/storageworks/tapecompatibility.html>
- Business continuity: <http://h18000.www1.hp.com/storage/solutions/bcontinuity.html>

## Cluster limitations and recommendations

This section describes OS-specific cluster limitations and support:

- [HP-UX clusters](#)
- [OpenVMS clusters](#)
- [Tru64 UNIX clusters](#)
- [Linux clusters](#)
- [Windows 2000/Windows Server 2003 clusters](#)

### HP-UX clusters

Consider the following when using clusters with HP-UX:

- Clustering is supported only with select Serviceguard versions (see “[HP-UX host requirements and support](#)” on page 49).
- BC is not cluster-aware, but can co-exist with HP-UX clusters.

### OpenVMS clusters

Consider the following when using clusters with OpenVMS:

- The cluster must have a cluster IP address, and the IP address must be defined within TCP/IP.
- If a node running BC host agent software fails during the execution of a BC job, that job also fails. Undoing and re-executing the job usually allows job completion.
- One of the nodes in the cluster is automatically assigned the role of cluster impersonator. BC is now cluster-aware and can be installed on any node within the cluster, but starts only on the node acting as the cluster impersonator. If this node fails or shuts down, the impersonator immediately moves to a different node. The BC host agent software on this new impersonator node starts running. Restarting the BC job allows the job to complete successfully unless the BC failover watchdog has not been enabled. When enabled, the BC failover watchdog ensures that if the node running BC fails, then BC will automatically run from another node, allowing all BC jobs to run as normal.

To enable the BC failover watchdog, manually run the following command line or add this command line to the node startup file for each node:

```
run sys$startup:bc_failover
```

- Mount Volume Sets cluster-wide to allow replication by BC. BC *does not* support performing jobs on Volume Sets that are not mounted cluster-wide.
- A Volume Set can be replicated/mounted back to the same host/cluster as the source disk. The Volume Set mounts cluster-wide using the `\cluster` switch. Volume Sets replicated/mounted to a different host/cluster as the source host/cluster default to a system-wide mount unless a Volume Set with the same name already exists. In this case, the replicated Volume Set mounts process-wide.
- The name/mount point of replicated Volume Sets cannot be changed. HP recommends using the default volume set name that displays in the drop-down list when editing the MOUNT operation.

## Tru64 UNIX clusters

Consider the following when using TruClusters:

- BC host agent software is installed to the cluster and resides on a share drive that is available to each node.
- If the node running the BC host agent software fails during the execution of a job, that job also fails. Undoing and re-executing the job usually allows job completion.
- A Business Continuance Volume (BCV) presented by BC is accessible to all nodes in the cluster as long as one of the first two nodes (listed as active when the job was run) remains active.

## Linux clusters

Consider the following when using clusters with Linux:

- Clustering is supported only with select Serviceguard versions (see “[Linux host requirements and support](#)” on page 53).
- BC is not cluster-aware, but can co-exist with Linux clusters.

## Windows 2000/Windows Server 2003 clusters

Consider the following when using clusters in a Windows environment:

- HP requires installing the BC host agent software on each node in the cluster.
- Enable host cluster support on all nodes of the cluster.
- Windows 2000 hosts only: When the BC host agent software is installed on a cluster, BC jobs can mount BCVs of non-cluster volumes to individual clustered nodes (active or inactive).

BCVs of cluster volumes can be mounted to all nodes of the cluster with the exception of the quorum disk (once mounted, the BCV becomes available only to the node on which the BCV is mounted). HP *does not* support placing BCVs into the cluster as resource disks.

- If creating a BCV of the cluster quorum disk, *do not* mount the BCV on a member of the same cluster unless the entire cluster is off-line.
- SUSPEND and RESUME operations can be performed on the cluster, but MOUNT and volume style replication operations must be performed against the individual cluster members.



# BC Replication Licensing

## 4

To perform BC replication on a given storage system, the system must be properly licensed as follows:

- EVA storage systems

BC functionality (snapshot and snapclone) on an EVA storage system requires a BC license-to-use (LTU) and installation of an associated license key. With the purchase of a BC EVA LTU, HP provides the license agreement and instructions on retrieving and installing the electronic license key. The Command View EVA GUI is used to install and manage license keys. License keys cannot be entered or managed from the BC GUI.

Refer to the *HP StorageWorks Business Copy EVA Replication License Key Installation Instructions* (AV–RVJGB–TE) to install a license key.

- MA/EMA storage systems

BC functionality (snapshot and clone) on an MA/EMA storage system requires an F, S, or P version of ACS (for example, v8.7P-4). Installing the ACS automatically enables the BC replication features on the system.

Snapshot functionality is provided only by the S and P ACS versions. Clone functionality is provided in all three versions.



# Starting and Browsing to BC

## 5

This chapter describes how to change the default BC server platform account login password and the tasks for setting up a browsing computer for accessing the BC GUI.

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**Note:** For newly installed BC networks, HP recommends following the procedures in the sequence listed.

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Topics include:

- [Setting up the Web browser](#), page 64
- [Changing the default BC server platform account login password](#), page 67
- [Browsing to the BC GUI](#), page 68

## Setting up the Web browser

This section describes the recommended browser settings for Microsoft Internet Explorer and Mozilla Web browsers. See “[Browser requirements and support](#)” on page 46 for supported browser versions. Topics include:

- [Verify cache settings](#)
- [Verify screen resolution](#)
- [Java Plug-in Control Panel setup](#)

### Verify cache settings

Use the stored pages option for the browser to prevent caching, ensuring that only updated pages are viewed in the GUI. Follow the instructions for each browser type.

*For Internet Explorer Browsers*

1. From the Desktop or **Start** menu, start a browser.
2. Click **Tools > Internet Options**.
3. From the **General** tab, under **Temporary Internet files**, click **Settings**.
4. Under **Check for newer versions of stored pages**, click **Every visit to the page**.
5. Click **OK**.
6. Click **OK**.

*For Mozilla Browsers*

1. Click **Edit > Preferences**.
2. In the navigation pane, click **Advanced > Cache**.
3. On the Set Cache Options page, under **Compare the page in the cache to the page on the network**, click **Every time I view the page**.
4. Click **OK**.
5. Click **OK**.

### Verify screen resolution

For GUI menus to be fully viewable and accessible for input, HP recommends the following settings:

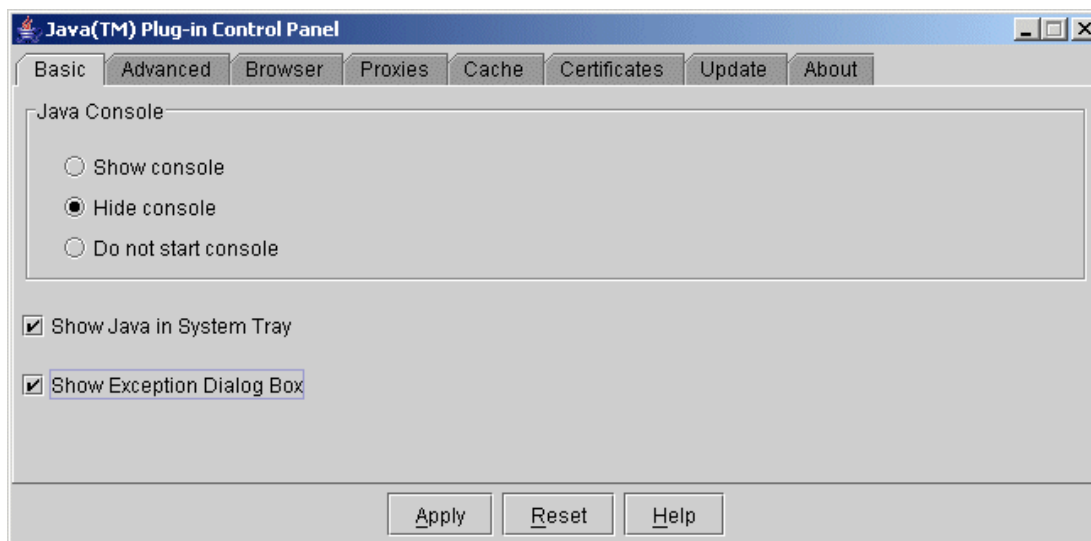
- A minimum display resolution of 1024 x 768 pixels, with 256 or more colors
- A full-screen browser display

### Java Plug-in Control Panel setup

JREs are configured through the Java Plug-in Control Panel (see [Figure 8](#)). This panel contains tabs that are OS dependent:

- Windows provides eight tabs: **Basic**, **Advanced**, **Browser**, **Proxies**, **Cache**, **Certificates**, **Update**, and **About**.
- HP-UX, Linux, and Solaris provide six tabs: **Basic**, **Advanced**, **Proxies**, **Cache**, **Certificates**, and **About**.





**Figure 8: Java Plug-in Control Panel (Windows example)**

To access the JRE control panel from:

- Windows, click **Start > Settings > Control Panel** and then double-click **Java Plug-in**.
- HP-UX, Linux, and Solaris:
  - a. Open a browser.
  - b. Click **File > Open**.
  - c. Browse to where the JRE is installed:
    - HP-UX and Solaris: typically in `/usr/j2se/jre`
    - Linux: `/usr/java/j2re1.4.2_02/bin/ControlPanel`
  - d. Double-click `ControlPanel.html`.

For StorageWorks applications, key configuration tabs are:

- Advanced
- Cache
- Update (Windows only)

## Advanced tab

Use the **Advanced** tab for troubleshooting. If multiple JREs are currently installed or different JREs have been installed and uninstalled on a computer, specifying the desired JRE might resolve JRE conflicts and collisions.

## Cache tab

JRE Cache is “sticky cache,” which means that the disk cache is created and controlled by the Java Plug-in and the browser cannot overwrite this disk cache. Since caching prevents the applet from downloading off the server each time information is referenced, JRE caching is detrimental to StorageWorks applications because storage data might change after caching the applet.

To clear and disable JRE caching, complete the following procedure from the **Cache** tab:

1. If necessary, select **Enable Caching**.

2. Click **Clear**.  
A confirmation pop-up window displays.
3. Click **OK**.
4. Deselect **Enable Cache**.

### Update tab (Windows only)

By default the **Update** tab is set to **Check for Updates Automatically**. In a properly configured and functioning system, an automatic update can be an unnecessary intrusion. HP recommends disabling the automatic-update option by deselecting **Check for Updates Automatically**.

---

**Note:** For additional Java Plug-in Control Panel information beyond this brief overview, visit [http://java.sun.com/j2se/1.4/pdf/developer\\_guide.pdf](http://java.sun.com/j2se/1.4/pdf/developer_guide.pdf).

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## Changing the default BC server platform account login password

HP recommends changing the default password for the administrator account immediately upon browsing to the BC server platform for the first time.



**Caution:** Failing to change the default administrator account password is a major security infraction that makes the account vulnerable to destructive behavior. Always change the default password for each account upon first login.

**Note:** On the BC server platform account login page:

- The default *user* name is the account name (administrator, operator, or user) and the password is set to anonymous.
- The default *administrator* account name provides permissions of the highest level of access.

If the BC server platform is an SMA, refer to the *HP OpenView Storage Management Appliance User Guide* (AA-RS0AD-TE) for instructions on changing login account passwords.

If the BC server platform is an SMS, change the default login account passwords using the following procedure:

1. Browse to the BC server platform using the following format:

**https://<BC\_server\_platform\_name or IP\_address>:2381**

The System Management Homepage login page displays.

2. Log in as the administrator:

User: administrator

Password: administrator

3. Click **Settings**.
4. Under HTTP Server, click **Change Password**.
5. Select the account password to change from the **User** drop-down list.
6. For **New Password**, enter the new password.
7. For **Confirm Password**, enter the new password again.
8. Click **Change Password**.
9. If desired, repeat [step 5](#) through [step 8](#) to change the password for another account (operator or user).

## Browsing to the BC GUI

To browse to the BC GUI, the following is required:

- An operating BC server platform
- A running BC server service
- A supported browsing computer OS
- A supported browser and JRE combination installed on the browsing computer

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**Note:** Performing “local browsing” to the BC GUI can result in a JRE conflict and a possible loss of BC functionality. This includes running the platform via a Terminal Services session.

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**Note:** HP recommends installing the JREserver package immediately before or after the BC server software installation.

---

BC is compatible with, and can be accessed from, the following applications:

- HP Systems Insight Manager
- HP System Management Homepage

In general, use the following steps to browse to the BC GUI:

1. Verify that the browsing computer is a supported OS, containing a supported browser and JRE combination using [Table 19](#) on page 47.

If a supported browser and JRE combination are installed on the browsing computer, continue with [step 4](#).

If a supported browser and JRE combination are *not* installed on the browsing computer, complete the following:

- a. Install a supported browser or locate a supported OS computer with a supported browser.
- b. Refer to the JREserver Installation Guide to install JREserver on the BC server platform.
- c. Log in to the BC server platform and access the BC GUI using one of the following methods:
  - Insight Manager—Click **Tools > Storage Management > Business Copy**.
  - System Management Homepage—Under **Other Agents**, click **Business Copy** or **Storage Management Appliance**, and then click **Tools > business copy**.
  - Browsing with the following URL format:

**https://<BC\_server\_platform\_name or IP\_address>:2381**

---

**Note:** Previous Web browser bookmarks to BC do not work. The process for accessing the BC GUI has changed, making old bookmarks obsolete.

---

If the BC GUI *does not* detect a supported JRE on the browsing computer, the BC GUI displays the following:

- For IE browsers, a Web page containing the error message:

The Java 2 plug-in necessary to run this applet has not been installed.

- For Mozilla browsers, a **Plug-in Not Loaded** dialog box displays. Click **Get the Plug-in** to continue, which displays a Web page containing the error message:

The Java 2 plug-in necessary to run this applet has not been installed.

**Decision:** Determine which installation method to use and follow the on-screen instructions to download and install the minimum supported JRE. HP recommends using the *JREserver Installation* method whenever possible. Continue with [step 2](#).

2. Select an installation method for obtaining a supported JRE:
  - **JREserver Installation** (recommended)—Requires a previous installation of JREserver on the BC server platform and provides a 3-step approach to downloading and installing an OS-specific JRE (see [Figure 9](#)). Make sure to read the installation instructions for the selected OS.

To install the Java™ 2 Plug-In for your browser, follow the steps below.

**Step 1: Select the operating system on which you run your browser.**

– Select an OS –

**Step 2: View the installation instructions.**

View Instructions

**Step 3: Download the Java Runtime Environment (JRE or RTE) and Java Plug-In (JPI) software.**

Download JRE/JTE/JPI

**Figure 9: JREserver installation download page**

- **Internet-Download Installation** —Provides an OS-specific table containing browser and JRE information with links for locating minimum supported JREs. See [Table 19](#) on page 47.
3. Download and install the JRE as directed.

**Note:** Before beginning the JRE installation, close all open instances of all browsers to ensure that the JRE installs properly. In some cases, the JRE installation might require rebooting the browsing computer before the JRE functions properly.

4. Browse to and log in to the BC server platform using one of the following methods:
  - Insight Manager—Click **Tools > Storage Management > Business Copy**.
  - System Management Homepage—Under **Other Agents**, click **Business Copy** or **Storage Management Appliance**, and then click **Tools > business copy**.
  - Browsing with the following URL format:  
`https://<BC_server_platform_name or IP_address>:2381`
5. Verify that the BC GUI displays storage system resources by clicking the **Resources** tab. In the left pane, check the following:
  - All expected storage systems are displayed.  
If not:
    - Check the storage managers to verify that the expected storage systems are being presented to BC.
    - Verify that storage systems are zoned properly for the appropriate BC server platform.
    - Were passwords recently changed in the storage manager or System Management Homepage, and the duplicate change for BC utilities overlooked? If yes, see [“Synchronizing passwords between BC and storage managers”](#) on page 82 to resynchronize the passwords.
  - All expected BC-enabled hosts are displayed.  
If not, see [“BC-enabled hosts not displaying”](#) on page 110 to troubleshoot.

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**Note:** After installing the BC server, old application shortcuts and browser bookmarks to System Management Homepage-based applications might not function. However, for convenience, these application links are added to the System Management Homepage navigation bar under **“Other Agents.”**

---

After accessing the BC GUI and verifying resource availability, BC jobs can be created, modified, or run. Refer to the BC Online Help & User Guide for information on planning and creating jobs.

---

**Note:** After a supported browser and JRE combination are installed, the JRE installation information can be easily accessed using one of the following URL formats:

`https://<BC_server_platform_name or IP_address>:2381/business_copy/html/jremethods.html`

From this Web page, click **JREserver Installation** for a JRE download page or click **Internet-Download Installation** for a table of all BC-supported JREs.

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# Best Practices and Maintenance Tasks

## 6

This chapter describes best practices and maintenance tasks associated with BC. Topics include:

- [Best practices](#), page 72
- [Maintenance tasks](#), page 77

## Best practices

This section describes best practices for running a BC network. Topics include:

- [Avoiding browser session timeout](#), page 72
- [Saving jobs and configurations](#), page 72
- [Reloading jobs and configurations](#), page 72
- [Optimizing performance](#), page 73
- [Establishing archive interval and threshold values for host agent logs](#), page 75
- [BC GUI performance features](#), page 75

### Avoiding browser session timeout

In the BC GUI, the browser session to a BC server platform times out after 15 minutes of inactivity, requiring another login to the BC GUI. Therefore, when creating jobs or making changes on the Configuration page where an explicit Save is required, HP recommends saving often. Under certain circumstances, the Web server may also reset the connection between the browser and the BC GUI. If the Running Jobs window displays the message `Refresh Browser`, the connection has been reset and any information not saved before the reset will be lost.

### Saving jobs and configurations

BC stores job files and critical configuration data on the BC server platform. HP recommends saving this information to a host computer on a continual basis, either periodically or whenever a BC job is created, modified, or deleted. Being able to reload the BC configuration after a BC server platform or BC server failure can prevent re-creating BC jobs and reinstalling the BC host agent software.

To save BC jobs and configuration information, use the BC Configuration Save/Reload feature in the BC GUI. Typically, saving the configuration requires less than 1 MB of storage. In extreme cases, the amount of storage required might exceed a few megabytes.

### Reloading jobs and configurations

After a configuration is saved, use the BC Configuration Save/Reload feature to download this information from the host computer to the BC server platform. Because a Reload is primarily required following a failure, some manual cleanup is expected. In particular, any BC job that was running at the time of the failure must be reviewed, cleaned up, and rerun. Note the following:

- When a saved BC configuration is reloaded, the job-state information is lost. The job state defines the current operational status of the job (idle, running, complete, or undo complete). If state information is lost, the ability to undo a complete or partially complete job is lost. If this occurs, manually remove all mounted BCVs and modify the storage configuration to return this configuration to its original state.
- Restoring the storage configuration to its original state can be accomplished either manually by using a configuration worksheet that describes the details of each unit on the storage system or automatically with the features built into the array controller. ACS documentation includes a configuration worksheet that can be used for manual restoration and that also gives detailed information on how to use the automatic restoration feature.



- When restoring the storage configuration to a previous state, the Scheduler job must be stopped before initiating the Reload. Leaving the Scheduler job running prevents the Scheduler from being restored. Stopping the Scheduler job before the Reload enables the Scheduler to be restored along with the rest of the jobs.

## Optimizing performance

BC performance depends on several factors, including the number of jobs running, the number of steps and complexity of the jobs, and I/O activity on the storage systems and hosts.

**Table 28: Optimizing performance**

Problem	Description	Resolution
Slow BC server response	BC supports up to eight simultaneous BC jobs. Even though job execution takes place in parallel, some job operations must be done serially (such as storage system and BC-enabled host access). This fact imposes practical limits on the number of jobs that can be run simultaneously. When running more than eight jobs, the BC server becomes less responsive to new requests and performance starts to be impacted.  In a single job, BC can access up to eight different MA/EMA storage systems or two different EVA storage systems.	Review how jobs are scheduled and find a way to load balance them to prevent too many jobs from running simultaneously.  Ensure that unique storage and host resources are specified for jobs that must run simultaneously.
	Excessive memory consumption causes a gradual decrease in BC performance.	BC performs a periodic internal update procedure that helps prevent excessive memory usage and ensures optimal performance. To prevent this process from impacting BC job execution, BC does not perform this procedure while a BC job is currently running.  In extremely busy configurations, a BC job may be running at all times and prevent the update procedure from running. In this case, BC memory consumption continues to increase gradually over time, causing a general decrease in BC performance.  To prevent excessive memory consumption, ensure that BC has at least 30 seconds of inactivity (where no jobs are running) at least twice a day to allow the BC periodic internal update procedure to run.

**Table 28: Optimizing performance (continued)**

Problem	Description	Resolution
Slow BC GUI and job performance	More than 16 browser sessions can result in excessive BC server platform memory usage, decreasing overall GUI performance.	Decrease the number of browser sessions that simultaneously access BC.
	Using more than 25 MA/EMA storage systems and more than 16 EVA storage systems can affect BC GUI and job performance.	Follow storage requirements described in <a href="#">"Storage system requirements and support"</a> on page 43.
	Large BCVs on busy storage systems can take several hours to delete.	Schedule deletes appropriately to allow the job undo to complete before running the job again.
	BC GUI responds slowly to requests when creating and editing BC jobs.	BC GUI responsiveness depends on the number of jobs currently running and the size of the configuration (storage systems and host computers). To reduce long response times, perform all job creation and maintenance operations when no BC jobs are running.
	Using volume groups can affect BC jobs.	The fewer the physical volumes (units) in a volume group or domain, the faster and more efficiently the BC job performs.
Slow BC GUI and job performance (continued)	AIX and HP-UX parameter: UNMOUNTVGSOURCE	BC jobs generally execute more quickly when the UNMOUNTVGSOURCE parameter is set to "false," because the jobs do not unmount affected mount points, nor perform any volume group exports. However, this method <i>does not</i> guarantee data integrity or availability, because mount points and volume groups remain active during the creation of the point-in-time copy.  The default setting after installing the BC host agent software is "false." If desired, edit the setting in /usr/opt/CPQevm/bin/OSVM.ini.
	Job operation sequence for remounting a BCV can affect performance.	When replicating storage, mounting the storage on a host, and then remounting the same storage somewhere else, the sequence of operations used might not be optimal.  For example, using the following sequence, the MOUNT operation can take a long time, consequently suspending the application for a long time.  SUSPEND SNAP MOUNT SNAP RESUME MOUNT  To avoid staying in the "suspended" state any longer than necessary, use the following sequence of operations:  SUSPEND SNAP SNAP RESUME MOUNT MOUNT

## Establishing archive interval and threshold values for host agent logs

Disk space for logging is normally a low priority. However, when disk space is limited, the ability to establish how often to archive the current log file can become a valuable asset. Modifying the host agent `sb.ini` configuration file can minimize the loss of log information when archiving occurs on a system with limited disk space.

---

**Note:** BC generates only eight archive log files before the oldest log file information is overwritten.

---

Two fields in the host agent `sb.ini` file determine when the current host agent log file is archived: `ARCHIVE_INTERVAL` and `ARCHIVE_THRESHOLD`. The default settings are: `ARCHIVE_INTERVAL` = 6 hours (specified in seconds) and `ARCHIVE_THRESHOLD` = 10,485,760 bytes. BC checks the current log file size once every interval. If the log file size is greater than the threshold, the current file is archived. Reducing either field value allows log archiving to occur more often. If disk space is low, HP recommends setting the archive interval to 1 hour and/or setting the threshold based upon a minimum disk space allowed for logging (equating to “threshold value” x 9).

## BC GUI performance features

The following sections describe features in the BC GUI that can affect performance. For detailed information, refer to the BC Online Help & User Guide. Topics include:

- [Available storage systems](#)
- [Storage system refresh interval](#)

### Available storage systems

BC compiles a list of available storage by querying every MA/EMA and EVA storage system in the SAN during startup and again at each periodic storage refresh. The more storage systems involved, the longer the refresh time frame.

For EVA storage systems, BC allows selective filtering out of those storage systems not needed for BC jobs using the BC GUI option: **Configuration > HSV Options**. Making selected storage systems unavailable to BC decreases the startup and storage refresh time frame.

### Storage system refresh interval

Successful BC job execution depends on BC having up-to-date storage configuration information, making periodic refreshes a critical function. Always consider the following factors when establishing the refresh rate:

- If the storage configuration changes (for example, through the creation of a new unit or the deletion of an existing unit), BC remains unaware of the change until a storage refresh occurs. Meanwhile, BC jobs might fail as a result of using out-of-date storage information.
- Refreshes are resource-intensive operations and, in extreme cases, can take as long as five minutes per storage system to complete. Choosing an appropriate value for the refresh rate—a rate that balances performance with the need for current information—is an important part of managing a BC environment.
- In stable environments where the storage configuration does not change frequently, a longer refresh interval ensures better performance. In environments where storage changes frequently, a shorter refresh interval might be required.

- The refresh rate is also dependent on the workload of the storage manager.  
For example, if the storage manager is performing a resource-intensive function, the storage manager becomes less responsive and makes BC discovery slower.
- By default, BC refreshes the storage configuration information displayed by the BC GUI every 6 hours (360 minutes). This periodic refresh is advantageous for large configurations. This refresh rate is adjustable, but the BC GUI limits the refresh rate to no less than 5 minutes multiplied by the number of storage systems.  
For example, if a configuration contains 10 storage systems, then the minimum refresh rate equates to every 50 minutes.

For complete details on refresh intervals and jobs, refer to the BC Online Help & User Guide and click **Network Planning > Device Discovery Planning**.

## Maintenance tasks

This section describes tasks that might need to be performed after a BC environment is up and running. Topics include:

- [Adding or removing a BC-enabled host](#), page 77
- [Removing a BC network](#), page 78
- [Controlling BC services, daemons, and processes](#), page 78
- [Replacing or renaming a BC server platform](#), page 80
- [Migrating MA/EMA BC jobs to use EVA storage systems](#), page 82
- [Synchronizing passwords between BC and storage managers](#), page 82
- [Adding EVA storage systems](#), page 84
- [Establishing storage manager remote access](#), page 84

### Adding or removing a BC-enabled host

Refer to the OS-specific BC Host Agent Installation Guide to install or remove BC host agent software.

Consider the following when adding BC host agent software to a host computer in a BC environment:

- Before installing the BC host agent software, ensure that the new host computer is communicating with the BC server platform.
- Each new BC-enabled host must be connected to a BC server platform using the fully qualified name, unqualified name, or IP address for this platform.
- Ideally, ensure that the BC server software is running when installing BC host agent software, allowing the BC server to validate the existence of this new BC-enabled host.

If the LAN is down or offline, the BC host agent software can still be installed. A manual verification of the connection between the BC server and the new BC-enabled host must be performed.



**Caution:** If not properly planned, removing BC host agent software from a BC-enabled host can result in reduced operational capabilities and potential loss of data.

**Table 29: Ramifications of removing BC host agents from a BC-enabled host**

Action	Ramification	Consideration
Stop the BC-enabled host service, daemon, or process.	All BC jobs associated with this host stop.	<ul style="list-style-type: none"> <li>■ Ensure that all jobs associated with the BC-enabled host are in one of the following states: any Idle state, Invalid, or Undo Complete.</li> <li>■ Modify jobs to point to a new BC-enabled host (if applicable).</li> <li>■ Delete jobs no longer in use (if applicable).</li> </ul>
Remove the BC host agent software from a BC-enabled host.	The BC-enabled host icon remains displayed on the Resources page in the BC GUI.	Use the Delete Host function on the Resources page in the BC GUI to prevent the host from displaying on the Resources page following a BC server platform reboot.

## Removing a BC network

To remove a BC network from a BC environment, use the following procedure:

1. In the BC GUI, ensure that all BC jobs associated with the BC network have completed and are in any Idle, Invalid, or Undo Complete state.
2. Use the BC GUI **Configuration > Save/Reload** feature, if desired, to save job and configuration information to another computer.
3. Remove the BC host agent software from all BC-enabled hosts in the BC network.  
Refer to the OS-specific BC Host Agent Installation Guide to remove BC host agent software.
4. If desired, remove the BC server from the BC server platform.

Refer to the BC Server Installation Guide to remove BC server software.

## Controlling BC services, daemons, and processes

This section describes procedures for starting and stopping services/daemons/processes for the BC server and host agents. Topics include:

- [Stopping/starting the BC server](#), page 78
- [Stopping/starting BC-enabled host service](#), page 78
- [Stopping/starting SMA utilities](#), page 80

### Stopping/starting the BC server

During installation, the BC server installs as a Windows service on the BC server platform. The BC server service starts automatically following installation and must be kept running to create, run, monitor, or manage all BC jobs in the BC network.



**Caution:** *Do not* stop the BC server unless the BC network is intentionally being shut down. Stopping the BC server also shuts down the associated BC network. Any BC job running on the BC network stops, and no BC job can be run until the BC server is started again. Additionally, BC jobs that were running when the BC server stopped might require manual recovery before these jobs can be run again.

---

To stop or start the BC server service from the BC GUI:

1. Click **Home > Settings > Manage Tools > Business Copy**.
2. Click **Stop** or **Start**.

### Stopping/starting BC-enabled host service

BC-enabled hosts are installed as a Windows service for the Windows operating system, a daemon for Linux and UNIX operating systems, or a process for OpenVMS operating systems. The BC-enabled host service/daemon/process automatically starts following BC host agent software installation. Restarting a BC-enabled host automatically starts the service/daemon/process.



**Caution:** Do not stop a BC-enabled host that is participating in running BC jobs. Stopping the BC-enabled host service/daemon/process on a host computer prevents that computer from participating in BC jobs.

Additionally, BC jobs that were running when the BC-enabled host stopped might require manual recovery before these jobs can be run again.

*For Windows hosts* To stop or start the BC service for a BC-enabled host:

1. Open the Windows Services window:
  - For Windows 2000, click **Start > Settings > Control Panel > Administrative Tools > Services**.
  - For Windows Server 2003, click **Start > Settings > Control Panel > Services**.
2. Click **Switchboard**.
3. To stop the service, click **Stop**; to start the service, click **Start**.

*For Linux hosts* The following procedure requires root permissions.

To stop or start the BC daemon for a BC-enabled host:

1. Open a terminal window and log in as a super-user or root.
2. Change the working directory to `/opt/CPQevm/bin`.
3. Stop or start the BC daemon requires two commands for each action as follows:
  - `service Switchboard <action>` (action = stop, start, restart, or status)
  - `service bdctrvc <action>` (action = stop, start, restart, or status)

*For OpenVMS hosts* The following procedure requires system privileges.

To stop or start the BC process for a BC-enabled host:

1. Open a terminal window and log in as a super-user or root.
2. Stop or start the BC process as follows:
  - Stop: `@sys$startup:bc$shutdown.com`
  - Start: `@sys$startup:bcstartup.com`

*For UNIX hosts* The following procedure requires root permissions.

To stop or start the BC daemon for a BC-enabled host:

1. Open a terminal window and log in as a super-user or root.
2. Change the working directory as follows:
  - AIX: `/usr/opt/CPQevm/bin`
  - HP-UX and Solaris: `/opt/CPQevm/bin`
  - Tru64 UNIX: `/usr/opt/CPQevm/bin`
3. Stop or start the daemon using an OS-specific command as follows:
  - AIX:
    - Stop: `evmshutdwn`
    - Start: `entrprsvolmgr`

- HP-UX:
  - Stop: `./entrprsvolmgr stop`
  - Start: `./entrprsvolmgr start`
- Solaris:
  - Stop: `/etc/rc2.d/K89entrprsvolmgr stop`
  - Start: `/etc/rc3.d/S89entrprsvolmgr start`
- Tru64 UNIX:
  - Stop: `/sbin/rc2.d/K89entrprsvolmgr stop`
  - Start: `/sbin/rc3.d/S89entrprsvolmgr start`

## Stopping/starting SMA utilities

When performing maintenance on the SMA, such as using the Backup/Restore Appliance utilities, the BC server must be restarted. Failure to restart the BC server can cause storage systems to be omitted from being discovered and displayed in the BC GUI, and eventually jobs could be affected.

Ensure that no jobs are running, or are scheduled to run, whenever restarting the BC server.

## Replacing or renaming a BC server platform

Replacing or renaming a BC server platform has implications and procedures that must be followed to ensure BC operability.

**Table 30: Procedures for replacing or renaming a BC server platform**

Task	See...
Replacing an existing BC server platform	<a href="#">Replacing a BC server platform</a>
Renaming a BC server platform <i>before</i> the BC network is up and running with a BC server and host agents	<a href="#">Renaming a BC server platform—Before a BC network is established</a>
Renaming a BC server platform <i>after</i> the BC network is up and running with a BC server and host agents	<a href="#">Renaming a BC server platform—After a BC network is established</a>

## Replacing a BC server platform

Use the following procedure to replace a BC server platform. The procedure assumes that you are replacing the BC server platform using the *current name* for the new platform; if renaming the BC server platform to a new or different name, follow instructions in “[Renaming a BC server platform—After a BC network is established](#)” on page 81.

1. Back up the BC server configuration and job files for this BC network using the **Configuration > Save** option in the BC GUI.
2. Rename the replacement BC server platform using the *current name*.  
For the SMA, renaming instructions are detailed in the *HP OpenView Storage Management Appliance User Guide* (AA-RS0AD-TE) for SMA software v2.1.
3. Reload the BC server configuration and job files using the **Configuration > Reload** option in the BC GUI.
4. Update the Command View EVA software to a supported version (see [Table 15](#) on page 44).



## Renaming a BC server platform—Before a BC network is established

If initially setting up a BC network (where the BC server and BC host agent software are not installed), HP recommends renaming the BC server platform to something familiar.

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**Note:** The default name for an SMA is the serial number. Because the serial number is unique to the hardware, leaving the name as the serial number makes SMA replacement more difficult to accomplish.

---

Changing the BC server platform name now:

- Avoids uninstalling and reinstalling BC server and other software if the BC server platform fails after establishing a BC network.
- Provides a more recognizable, user-friendly name for the BC server platform (such as Mars, Venus, Jupiter, and so forth).

Rename the BC server platform using the *current name*.

For the SMA, renaming instructions are detailed in the *HP OpenView Storage Management Appliance User Guide* for SMA software v2.1.

## Renaming a BC server platform—After a BC network is established

HP *does not* recommend renaming a BC server platform after a BC network is established because the procedure requires uninstalling the BC server (and possibly other value-added software) from the platform and then manually updating all BC-enabled hosts. For large BC networks, this renaming process can become time-consuming.

To rename a BC server platform in an existing BC network, use the following procedure:

1. Ensure that no BC jobs are currently running on the BC server platform involved.

---

**Tip:** All BC jobs must be in one of the following states: any Idle state, Invalid, or Undo Complete.

---

2. Back up the BC server platform configuration and job files using the **Configuration > Save** option in the BC GUI.
3. Uninstall BC server software to prepare for renaming the BC server platform.

Determine the list of software to remove from an SMA by logging in to the SMA and following the SMA rename procedure. The SMA software dynamically provides a list of software that requires removal before the SMA can be renamed.

---

**Note:** To avoid creating an error condition, *do not* uninstall the BC server software using the Windows Add/Remove Programs feature. Instead, use the SMA software GUI to remove the BC server software (**Settings > Maintenance > Remove Software**).

---

4. Rename the BC server platform using the *current name*.

For the SMA, renaming instructions are detailed in the *HP OpenView Storage Management Appliance User Guide* for SMA software v2.1.

5. Reinstall the BC server software.

6. Reload the BC server platform configuration and job files backed up in [step 2](#) using the **Configuration > Reload** option in the BC GUI.
7. Update each BC-enabled host in the BC network to recognize the new name by either:
  - Reinstalling the BC host agent software (refer to the BC Host Agent Installation Guide for each OS), or
  - Updating the `sb.ini` file

To update the `sb.ini` file, use the following procedure:

- a. Stop the BC service for the BC-enabled host (see “[Stopping/starting BC-enabled host service](#)” on page 78).
- b. Using a file manager, navigate to:

`C:\Program Files\Compaq\SANworks\Enterprise Volume Manager\bin`

- c. Open the `sb.ini` file in a text editor.
- d. Under the Switchboard column header, locate the line:

`Appl_name: <name>`

- e. Replace the current name with the new name.

Do not leave a space between the colon and the new name. For example:  
`Appl_name: Colorado.`
- f. Save the file and exit the text editor.
- g. Start the BC service for the BC-enabled host (see “[Stopping/starting BC-enabled host service](#)” on page 78).

The BC-enabled host can now resume communications with the BC server.

## Migrating MA/EMA BC jobs to use EVA storage systems

To migrate MA/EMA BC jobs to use EVA storage systems, edit the jobs as follows:

- Change all MA/EMA storage system references to reflect an EVA storage system accessible to the BC network.
- Modify all BC jobs that use the CLONE operation.

EVA storage systems *do not* support the CLONE operation. The existing CLONE operation in the job cannot simply be edited. The drive letter for the EVA storage system is not selectable in the drop-down list for this operation (even though the storage system is displayed on the Resources page). The CLONE operation must be deleted and SNAP or SNAPCLONE selected before the BC GUI provides EVA storage system drive letters.

Refer to the BC Online Help & User Guide files for details on these operations.

## Synchronizing passwords between BC and storage managers

During the BC server software installation, the applicable storage manager passwords are entered for this BC environment to initially synchronize BC with the storage managers. Changing a storage manager password following the initial BC server installation requires a corresponding change for BC. Only the following storage managers require password synchronization:

- HSG Element Manager
- Command View EVA

The following conditions are possible during BC server software installation:

- If the BC detects the storage manager on the local host, BC automatically synchronizes with the storage manager password. In this case, if the storage manager password changes, then:
  - For the HSG Element Manager, BC remains synchronized with the storage manager.
  - For Command View EVA, BC must be manually updated to resynchronize with the storage manager as described in this section.
- If the BC *does not* detect a storage manager on the local host, BC must be initially pointed to the remote host containing the storage manager. In this case, if the storage manager password changes, BC must be manually updated to resynchronize with the storage manager as described in this section.



**Caution:** Whenever the storage manager password is changed from the storage manager, always update the stored BC password. Failure to maintain synchronization between the BC server platform account login page and BC prevents BC jobs from using EVA storage system resources. This omission can lead to reduced operational capability, and failure of BC jobs that include these resources.

**Note:** For information on changing the account login password on the BC server platform account login page, refer to the document that is applicable to the login environment: SMA software, Insight Manager, or System Management Homepage.

To synchronize BC passwords with the storage manager passwords, run the following procedure from the BC server platform.



**Caution:** Changing passwords while BC jobs are running can cause BC jobs to fail, and loss of data might occur. Change passwords only when BC jobs are in one of the following states: any Idle state, Invalid, or Undo Complete.

1. Stop the BC server service (see “[Stopping/starting the BC server](#)” on page 78).
2. Open a command line window.
3. Navigate to the /bin directory:

- For SMA:

```
C:\Program Files\Compaq\SANworks\Enterprise Volume Manager\bin\
hosts
```

- For SMS:

```
<Program Files>\Hewlett-Packard\Business Copy\bin\hosts
```

4. Enter the following command:

```
evmcl setpassword
```

The default user name is “administrator.”

5. Press **Enter**.

6. Follow the prompts to change the desired passwords:
  - HSV = Command View EVA
  - HSG80 = HSG Element Manager
7. Press **Enter**.

The authentication settings are recorded.
8. Start the BC server service (see “[Stopping/starting the BC server](#)” on page 78).

If the appropriate password information was entered, the BC and storage manager passwords are synchronized. Verify that all storage system hosts associated with the storage managers are displayed on the Resources page.

---

**Note:** In large configurations, the Resources page may take up to 30 minutes to update.

---

## Adding EVA storage systems

When adding EVA storage systems to a BC network, be aware that BC checks the BC replication license information at startup. Also, adding or changing license information requires restarting the BC server before BC can recognize these changes.

## Establishing storage manager remote access

Enable remote access for the HSG Element Manager using the following procedure.

---

**Note:** Command View EVA *does not* require manual remote access enabling. This storage manager continuously monitors a communication port and allows any BC server platform that supplies a valid password to access the managed storage resources.

---

1. Browse to the HSG Element Manager GUI on the SMA.
2. Click **Options**.
3. Click **Agent Options**.
4. Under Add Client in the **Host Name** box, enter the network name or IP address of the BC server platform.

---

**Note:** For flexibility, HP recommends adding three entries for the BC server platform: the fully qualified name, unqualified name, and IP address.

---

5. Click **Agent Config**.
6. Click **Submit**.

The network name or IP address displays in the Client window.
7. Stop and restart BC server service using “[Stopping/starting the BC server](#)” on page 78.

# Using Volume Groups, Disk Groups, and Domains

## 7

This chapter describes the requirements and best practices when using volume groups, disk groups, or domains. Topics include:

- [Definition: Volume groups, disk groups, and domains](#), page 86
- [Volume group, disk group, and domain requirements and support](#), page 87
- [HP-UX requirements and support](#), page 88
- [Tru64 UNIX requirements and support](#), page 90
- [AIX requirements and support](#), page 92
- [Linux requirements and support](#), page 94
- [Solaris requirements and support](#), page 95

## Definition: Volume groups, disk groups, and domains

A *volume group* (HP-UX, AIX, and Linux), a *dynamic disk group* (Solaris), or a *domain* (Tru64 UNIX) is a set of one or more physical volumes from which space can be allocated to one or more logical volumes or filesets. Volume groups (VGs), dynamic disk groups (DGs), and domains are the minimum containers that BC uses for replication.

The HP interpretation of volume groups, disk groups, and domains includes a configuration that can consist of multiple MA/EMA or EVA storage systems and multiple units. Each VG, DG, or domain is referenced by a single name and consists of physical volumes. A logical volume or fileset is a subset of the VG, DG, or domain and is mountable.

## Volume group, disk group, and domain requirements and support

Table 31 lists the requirements and support for using VGs, DGs, and domains in a BC network.

**Table 31: Volume group, disk group, and domain requirements and support**

Required	Remarks
Storage system replication space	BC supports any VG, DG, or domain that has all physical volumes on storage systems accessible to the BC server platform: <ul style="list-style-type: none"> <li>■ VG, DG, or domain on all MA/EMA storage systems, or</li> <li>■ VG, DG, or domain on all EVA storage systems</li> </ul>
Identical storage system version levels	HP strongly recommends installing an identical ACS version level on all MA/EMA storage systems and an identical VCS version level on all EVA storage systems.
Volume syntax in BC job operations	Although BC job operations provide both unit and volume syntax, HP recommends using the volume syntax. Volume syntax ensures that the replication sources are specified in terms of the host on which they reside and the applicable fileset or domain the logical volume or VG/DG name. This method allows BC to quiesce the AdvFS domain VG/DG being replicated and also allows BC to gather the metadata necessary to reconstruct the replicated domain VG/DG on the mount-on host.  With unit syntax, replication sources are specified in terms of the applicable storage system and unit number. This method <i>does not</i> provide any mechanism for quiescing an AdvFS domain or VG/DG for gathering the metadata necessary to reconstruct a domain on the VG/DG on the mount-on host.  Unit-style syntax is suitable only for UFS or raw devices and is not supported with AdvFS non-LVM devices.
Not supported	Remarks
Mixing storage systems	BC <i>does not</i> support mixed MA/EMA and EVA storage system for a VG, DG, domain, or single replication job.
Microsoft Volume Shadow Copy Services	BC <i>does not</i> support installing BC host agent software on Windows Server 2003 hosts using Volume Shadow Copy Services, because of interoperability issues.
Windows 2000 Dynamic Disks	BC allows specifying Dynamic Disks as source units when creating a BCV, but attempts to mount the BCV can result in job failure.
Best practices	Remarks
Limit physical volumes in a VG or domain	BC jobs run faster and more efficiently when fewer physical volumes (units) are used in a VG or domain.
Check resources	Before running a BC job, ensure that sufficient resources exist on each MA/EMA or EVA storage system to simultaneously replicate all of the physical volumes in a VG or domain. BC must find free disk space on the same storage system as the source disks.

## HP-UX requirements and support

This section lists HP-UX requirements, support, and other important information. Topics include:

- [HP-UX logical volume manager support](#)
- [HP-UX—What you should know](#)

## HP-UX logical volume manager support

[Table 32](#) lists BC support for LVM.

**Table 32: HP-UX LVM support**

Topic	Supported/not supported
Logical volumes	No more than 128 logical volumes per VG is supported.
Disks	No more than 16 disks per VG is supported.
File systems	BC supports the VERITAS File System (VxFS) and HFS.
Minimum replication unit	A VG is the minimum replication unit. The data for a given logical volume can be located on any or all of the physical disks in a VG. As a result, a hardware-level replication of the logical volume (like that performed by BC) must copy all of the physical volumes in the VG in order to capture all of the data. This limitation also applies to logical volumes that have been extended to specific disks. For example, creating a copy of a VG with six physical volumes requires replication of all six volumes.

## HP-UX—What you should know

[Table 33](#) lists important information about HP-UX.

**Table 33: HP-UX—What you should know**

Topic	Remarks
Basic VG configuration	HP strongly recommends creating a basic VG configuration. A basic configuration consists of only one logical volume that is connected to a single VG consisting of one physical volume.
Multiple hosts	For multiple hosts in the BC network, use the basic configuration for each host.
Replicated VGs	A clone or snapshot copy of an HP-UX 11i v1 VG cannot be mounted onto an HP-UX 11i v2 host, and vice versa.  Do not run simultaneous BC jobs that are trying to replicate the same VG. Part of the process of replicating an HP-UX VG involves placing the VG that is being copied into a consistent state. BC does this through the VGfreeze utility. If multiple VGfreeze processes are executed against the same VG at the same time, one or more processes will fail, causing the BC job to fail.
VG maximum setting	HP-UX OSs support a default maximum VG of 10. Because each BC replication job creates a new VG on the mount-on host, systems at or near the maximum number might experience job failures. Use the <code>kmtune</code> utility to increase the maximum number of VGs to an appropriate level.



**Table 33: HP-UX—What you should know (continued)**

Topic	Remarks
VG names	<p>Each VG name on source hosts must be unique. HP recommends using a VG name that identifies the host on which the group resides, for example: Host1VG1.</p> <p>A common BC configuration involves the allocation of a single BC-enabled host as a backup server, which is used to mount and back up the replicated VGs from multiple source hosts. Such configurations are supported, but if more than one replicated VG is to be presented to the backup server at the same time, the source VGs from which the copies are created must have unique names.</p>
Layout or capacity changes in logical VG	<p>If the configuration of any of the VGs on the HP-UX host changes (in terms of physical disks in the VG or the logical volumes that are contained in the VG), the BC configuration files must be updated by running the <code>updatehost.sh</code> script located in the directory <code>.../opt/CPQevm/bin</code>.</p>

## Tru64 UNIX requirements and support

This section describes the Tru64 UNIX requirements, support, and other important information. Topics include:

- [Tru64 UNIX AdvFS support](#)
- [Tru64 UNIX logical storage manager support](#)
- [Tru64 UNIX—What you should know](#)

## Tru64 UNIX AdvFS support

[Table 34](#) lists AdvFS support and limitations.

**Table 34: Tru64 UNIX AdvFS support**

Topic	Supported/not supported
Storage	Each domain must consist entirely of MA/EMA or EVA storage systems.
Disks	No more than eight disks are allowed per AdvFS domain.
Filesets	No more than 128 filesets per Tru64 UNIX host is supported. The configuration can be one domain with 128 filesets or 32 domains with 4 filesets each.

## Tru64 UNIX logical storage manager support

[Table 35](#) lists LSM supported and non-supported features.

**Table 35: Tru64 UNIX LSM support**

Topic	Supported/not supported
LUNs	A maximum of eight LUNs per LSM disk group is supported.
LSM stripesets	Only LSM stripesets (RAID0) are supported. Parity (RAID5) and mirroring (RAID1) are not supported.
LSM volumes	<ul style="list-style-type: none"> <li>■ A maximum of eight LSM volumes are supported per AdvFS domain.</li> <li>■ AdvFS is supported on LSM or UFS volumes, not both. LSM and UFS volumes cannot be mixed in a single AdvFS domain.</li> <li>■ Raw files systems or UFS are not supported.</li> </ul>
LSM disk groups	<ul style="list-style-type: none"> <li>■ No more than one LSM disk group is supported per AdvFS domain; domains that span multiple LSM disk groups are not supported.</li> <li>■ LSM disk groups can contain only whole physical disks—partitions are not supported.</li> <li>■ BC can replicate only an entire disk group: BC cannot snap or clone a single volume in a disk group.</li> <li>■ LSM disk group can contain volumes from up to four MA/EMA storage systems and up to two EVA storage systems.</li> </ul>
LSM volumes and non-LSM disks	Combinations of LSM volumes and non-LSM disks in an AdvFS domain are not supported.

## Tru64 UNIX—What you should know

Table 36 lists important information about Tru64 UNIX.

**Table 36: Tru64 UNIX—What you should know**

Topic	Remarks
Minimum replication unit	Specifying either a single fileset or an entire domain as the replication source results in the entire domain being copied. Because an AdvFS domain is essentially a pool of storage that can be spread across many different disks, a method does not exist that can determine which disks contain the data for a given fileset. The only way to reliably copy fileset data is to copy <i>all</i> of the disks in the domain.
Do not run more than one BC job at the same time to replicate the same domain.	Part of the process of replicating an AdvFS domain VG involves placing the VG that is being copied into a consistent state. BC does this through the use of a utility called <code>VGfreeze</code> . The specific behavior of <code>VGfreeze</code> is determined by the state of the <code>UNMOUNTVGSOURCE</code> parameter. If multiple <code>VGfreeze</code> processes are executed against the same VG at the same time, a conflict is created and one or more of these processes will fail, causing the BC job to fail.

## AIX requirements and support

This section lists AIX requirements, support, and other important information. Topics include:

- [AIX logical volume manager support](#)
- [AIX—What you should know](#)

## AIX logical volume manager support

[Table 37](#) lists support for the LVM.

**Table 37: AIX LVM support**

Topic	Supported/not supported
Storage	All physical volumes must be located on MA/EMA or EVA storage systems.
Logical volumes	No more than 128 logical volumes per VG is supported.
Disks	No more than 16 disks per VG is supported.
File systems	BC supports the VERITAS File System (VxFS) and HFS.
Volume groups in jobs	One VG per job is supported; replicating multiple VGs requires the use of multiple BC jobs.
Journaled File System (JFS) log file name	Any volume group JFS log file name must be unique across all BC-enabled AIX hosts.
Minimum replication unit	A VG is the minimum replication unit. The data for a given logical volume can be located on any or all of the physical disks in a VG. As a result, a hardware-level replication of the logical volume (like that performed by BC) must copy all of the physical volumes in the VG in order to capture all of the data. This limitation also applies to logical volumes that have been extended to specific disks. For example, creating a copy of a VG with six physical volumes requires replication of all six volumes.
Volume group names	Each VG name on source hosts must be unique. HP recommends using a VG name that identifies the host on which the group resides, for example: Host1VG1.  A common BC configuration involves the allocation of a single BC-enabled host as a backup server, which is used to mount and back up the replicated VGs from multiple source hosts. Such configurations are supported, but if more than one replicated VG is to be presented to the backup server at the same time, the source VGs from which the copies are created must have unique names.
Replicating and mounting units	AIX cannot replicate a unit and then mount that unit on the same host. Copying an entire VG results in a new group that has the same VG name as the source. No two VGs can have the same name on the same host.

## AIX—What you should know

[Table 38](#) lists important information about AIX.

**Table 38: AIX—What you should know**

Topic	Remarks
Duplicate VG names	Duplicate VG names are not supported for AIX. A BCV of a source VG cannot be mounted back to the same host; a second copy of the same source cannot be mounted to the same destination.
Basic VG configuration	HP strongly recommends creating a basic VG configuration. A basic configuration consists of only one logical volume that is connected to a single VG consisting of one physical volume.
Multiple hosts	For multiple hosts in the BC network, use the basic configuration for each host.

**Table 38: AIX—What you should know (continued)**

Topic	Remarks
Replication copies	Do not run simultaneous BC jobs that are trying to replicate the same VG. Part of the process of replicating an AIX VG involves placing the VG that is being copied into a consistent state. BC does this through the <code>VGfreeze</code> utility. If multiple <code>VGfreeze</code> processes are executed against the same VG at the same time, one or more processes will fail, causing the BC job to fail.

## Linux requirements and support

This section lists Linux requirements, support, and other important information. Topics include:

- [Linux logical volume manager support](#)
- [Linux—What you should know](#)

## Linux logical volume manager support

[Table 39](#) lists BC support for LVM.

**Table 39: Linux LVM support**

Topic	Supported/not supported
Logical volumes	No more than 99 VGs and total of 256 LVs are supported.
Disks	No more than 16 disks per VG is supported.
File systems	BC supports ext2 and ext3.
Volume groups in jobs	Two VGs per BC job is supported.
Minimum replication unit	A VG is the minimum replication unit. The data for a given logical volume can be located on any or all of the physical disks in a VG. As a result, a hardware-level replication of the logical volume (like that performed by BC) must copy all of the physical volumes in the VG in order to capture all of the data. This limitation also applies to logical volumes that have been extended to specific disks. For example, creating a copy of a VG with six physical volumes requires replication of all six volumes.
Limits	Up to 99 volume groups with a grand total of 256 logical volumes can be created.

## Linux—What you should know

[Table 40](#) lists important information about Linux.

**Table 40: Linux—What you should know**

Topic	Remarks
Basic VG configuration	HP strongly recommends creating a basic VG configuration. A basic configuration consists of only one logical volume that is connected to a single VG consisting of one physical volume.
Multiple hosts	For multiple hosts in the BC network, use the basic configuration for each host.
VG names	Each VG name on source hosts must be unique. HP recommends using a VG name that identifies the host on which the group resides, for example: Host1VG1.  A common BC configuration involves the allocation of a single BC-enabled host as a backup server, which is used to mount and back up the replicated VGs from multiple source hosts. Such configurations are supported, but if more than one replicated VG is to be presented to the backup server at the same time, the source VGs from which the copies are created must have unique names.
Layout or capacity changes in logical VG	If the configuration of any of the VGs on the Linux host changes (in terms of physical disks in the VG or the logical volumes in the VG), the BC configuration files must be updated by running the updatehost.sh script located in the directory <code>.../opt/CPQevm/bin</code> .
Mounting VG-based BCVs	BC <i>does not</i> support mounting VG-based BCVs on the same host as the source.  The Linux operating system does not provide built-in LUN persistence. If you add or delete physical LUNS or disks in your system, there is a probability that device mnemonics will change in an undesirable way. When the BC-enabled host scans for the new devices, the device mnemonics for the VG might change. These mnemonics might shuffle between the source VG and target VG. This shuffling might cause the BC job to fail.

## Solaris requirements and support

This section lists Solaris requirements, support, and other important information. Topics include:

- [Solaris VERITAS Volume Manager support](#)
- [Solaris—What you should know](#)

## Solaris VERITAS Volume Manager support

[Table 41](#) lists support for VxVM.

**Table 41: Solaris VERITAS VxVM support**

Topic	Supported/not supported
Storage	All physical volumes must be located on MA/EMA or EVA storage systems.
Logical volumes	BC tested functionality to 64 logical volumes per DG.
Disks	BC tested functionality to 64 logical volumes per DG.
File systems	BC supports the VxVM and VERITAS File System (VxFS).
Disk groups in jobs	Multiple DGs per job is supported.
Minimum replication unit	A DG is the minimum replication unit. The data for a given logical volume can be located on any or all of the physical disks in a DG. As a result, a hardware-level replication of the logical volume (like that performed by BC) must copy all of the physical volumes in the DG in order to capture all of the data. This limitation also applies to logical volumes that have been extended to specific disks. For example, creating a copy of a DG with six physical volumes requires replication of all six volumes.
Disk group names	Each DG name on source hosts must be unique. HP recommends using a DG name that identifies the host on which the group resides, for example: Host1DG1.  A common BC configuration involves the allocation of a single BC-enabled host as a backup server, which is used to mount and back up the replicated DGs from multiple source hosts. Such configurations are supported, but if more than one replicated DG is to be presented to the backup server at the same time, the source DGs from which the copies are created must have unique names.
Replicating and mounting units	Solaris cannot mount a replicated DG with the same name as the source DG on the same host. The copied DG must have a different name than the source DG. No two DGs can have the same name on the same host.

## Solaris—What you should know

[Table 42](#) lists important information about Solaris.

**Table 42: Solaris—What you should know**

Topic	Remarks
Duplicate DG names	Duplicate DG names are not supported for Solaris. A BCV of a source DG cannot be mounted back to the same host using the same name as the source.
Basic DG configuration	HP strongly recommends creating a basic DG configuration. A basic configuration consists of only one logical volume that is connected to a single DG consisting of one physical volume.
Multiple hosts	For multiple hosts in the BC network, use the basic configuration for each host.
Replication copies	Do not run simultaneous BC jobs that are trying to replicate the same DG. Part of the process of replicating an Solaris DG involves placing the DG that is being copied into a consistent state. BC does this through the <code>VGfreeze</code> utility. If multiple <code>VGfreeze</code> processes are executed against the same DG at the same time, one or more processes will fail, causing the BC job to fail.





# Troubleshooting

## 8

This chapter describes known problems and suggested resolutions for troubleshooting the BC server and BC-enabled host functionality. Some of these entries were previously published in earlier versions of EVM or BC Release Notes. Topics include:

- [BC logs and other diagnostic files](#), page 98
- [BC server limitations and known problems](#), page 100
- [All OSs: BC-enabled host limitations and problems](#), page 113
- [HP-UX—BC-enabled host limitations and problems](#), page 115
- [OpenVMS—BC-enabled host limitations and problems](#), page 118
- [Tru64 UNIX—BC-enabled host limitations and problems](#), page 119
- [AIX—BC-enabled host limitations and problems](#), page 121
- [Linux—BC-enabled host limitations and problems](#), page 122
- [Solaris—BC-enabled host limitations and problems](#), page 124
- [Windows—BC-enabled host limitations and problems](#), page 125

## BC logs and other diagnostic files

BC logs are the primary source of diagnostic and troubleshooting information. Two types of logs are provided:

- [BC server platform logs](#)
- [Host agent logs](#)

To prevent the BC log files from consuming too much disk space, BC automatically archives the existing log file and starts a new file. Archiving occurs whenever:

- The BC log file size reaches 10 MB, or
- The BC server is restarted.

### BC server platform logs

[Table 43](#) lists the BC logs maintained on the BC server platform. View these logs in the BC GUI Logs page.

**Table 43: BC server platform logs**

Log type	Log name (.txt files)	Versions maintained	Description
Job	job_<job_name>	7	When a job runs for the first time, a BC job log file (such as job_name.txt) is created for this job. The individual operations that comprise the job are recorded in the job log file. Each time a job is run, the current BC job log file for that job is archived and a new BC job log file is created.
Broadcaster	sb	8	Generally not useful in troubleshooting.
Storage manager	bcweb	7	Generally not useful in troubleshooting.
BC server	bc	7	Provides BC server information.
Storage	sto	7	Provides storage information.
Host	<host_name>host	1	Provides host information.
Host volume	<volume_name>volumes	1	Provides host volume information.
Resource	ConfigurationReport	1	Provides a point-in-time list of discovered hosts and storage systems.

### Host agent logs

BC-enabled hosts generate BC Switchboard logs, which contain detailed information about the interaction between the BC-enabled host and the BC server. BC Switchboard logs are useful for diagnosing MOUNT, SUSPEND, RESUME, and LAUNCH operational issues.

These logs are stored on the BC-enabled host for each host OS. Locate host agent logs in the directories listed in [Table 44](#) if the BC host agent software installation used the default directory.

**Table 44: Host agent logs**

Host OS	Default installation directory
HP-UX	/opt/CPQevm/bin/logs
OpenVMS	SYS\$COMMON:[BC.LOGS]
Tru64 UNIX	/usr/opt/CPQevm/bin/logs
AIX	/usr/opt/CPQevm/bin/logs
Linux	/opt/CPQevm/bin/logs
Solaris	/opt/CPQevm/bin/logs
Windows 2000 and Windows Server 2003	<Program Files>\Compaq\SANworks\Enterprise Volume Manager\bin\logs

## BC-enabled host configuration files

The BC server generates configuration files, which contain current host, volume, and HBA information about each BC-enabled host. Two configuration files exist for each BC-enabled host and are stored on the BC server platform in the following directory:

- For SMA:

C:\Program Files\Compaq\SANworks\Enterprise Volume Manager\bin\hosts

- For SMS:

<Program Files>\Hewlett-Packard\Business Copy\bin\hosts

The two configuration filenames are:

- `servername.hst`—Contains host and HBA information
- `servername.vol`—Contains volume information

These files contain low-level information in eXtensible Markup Language (XML) format and are best understood by HP authorized service personnel.

## BC server limitations and known problems

This section describes BC server limitations and known problems, including:

- [Accessing BC GUI](#), page 100
- [Job errors and problems](#), page 105
- [BC GUI behaviors](#), page 108
- [BC GUI resource display problems](#), page 109
- [BC server hangs with Continuous Access EVA v1.1a](#), page 111
- [Uninstalling the BC server software from an SMA error](#), page 112

## Accessing BC GUI

This section describes problems related to accessing the BC GUI. Topics include:

- [Selecting JREserver Installation provides HTTP Status 404, Not Found](#), page 100
- [Error messages that prevent BC GUI access](#), page 100
- [Experiencing Java error messages such as “JRE Collision”](#), page 101
- [Web browser does not display the complete BC GUI during BC startup](#), page 101
- [General problems](#), page 102
- [Inability to browse to the BC server platform](#), page 103
- [Windows 2000 and Windows Server 2003 access problems](#), page 104
- [BC server platform reboot](#), page 105
- [Business Copy link is not presented within Insight Manager](#), page 105

### Selecting JREserver Installation provides HTTP Status 404, Not Found

*Description:* When browsing to the StorageWorks application GUI and selecting **JREserver Installation**, an HTTP Status 404, Not Found page displays with Request: `/jre_server/html/jreDownload2.html`.

*Resolution:* Install JREserver on the SMA or SMS being browsed to using JREserver Installation Guide.

### GUI does not display when using Mozilla 1.6

*Description:* Typically, this error is caused by installing multiple versions of Mozilla on the browsing computer (for example, 1.4 and 1.6). The Mozilla.org web site (<http://www.mozilla.org>) cautions users that only one installation of Mozilla can exist on a given computer.

*Resolution:* Prior to upgrading or installing a different version of Mozilla, uninstall the existing installation first.

### Error messages that prevent BC GUI access

*Applies to:* Any of the following error messages:

- HTTP Status 404, Not Found
- The page cannot be displayed
- Error: Access Is Denied
- 11001 - Host not found

**Description:** These error messages can display when trying to access a page on the intranet and can occur if either of the following conditions exist:

- The proxy settings are set to use the proxy server for all requests and the page is requesting authorization.
- The Web page is password protected.

**Resolution:** To resolve this issue, configure Internet Explorer to either use an automatic configuration script or a proxy server for the Local Area Network (LAN) Settings as follows:

1. Click **Start > Settings > Control Panel**.
2. Double-click **Internet Options**.
3. Click the **Connections** tab.
4. Click **LAN Settings**.
5. Choose *one* of the following proxy configurations:
  - **Use automatic configuration script**—Click the checkbox.
  - Using a manual proxy server—Complete the following steps:
    - a. Click **Use a proxy server for your LAN (These settings will not apply to dial-up or VPN connections)**.
    - b. Click the **Bypass proxy server for local (Intranet) addresses** check box.
    - c. Click **Advanced**.
    - d. Under **Exceptions, Do not use proxy server for addresses beginning with**, enter any specific intranet addresses, especially entire domains and subdomains, as desired.
6. Click **OK** to accept Proxy Settings changes.
7. Click **OK** to accept the LAN Settings changes.
8. Click **OK** to close the Internet Properties box.

---

**Note:** If using manual configuration of the LAN Connections in Internet Explorer, the **Bypass proxy server for local (Intranet) addresses** checkbox must be selected.

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For further information, refer to Microsoft Knowledge Base Article #KB166401.

## Experiencing Java error messages such as “JRE Collision”

**Description:** When a supported JRE is known to have been installed successfully, a JRE conflict or collision might still occur by the display of an error message.

**Resolution:** See “[Java Plug-in Control Panel setup](#)” on page 64 to verify the JRE configuration.

## Web browser does not display the complete BC GUI during BC startup

**Description:** This known issue is not an error, but rather an explanation of a possible condition. Following the initial BC startup and display, the applet-initialization process is launched and the message Loading Java Applet... displays in the bottom left-hand corner of the browser window status bar. At the start of the download process, the browser presents a Secure Socket Layer (SSL) query pop-up window that requests your approval to accept the security certificate. This security certificate allows you to verify the authenticity of the visiting site and to communicate

with the site securely. The download cannot continue until a response is given. Occasionally, this pop-up window becomes hidden behind the browser window, giving the impression that a problem exists with displaying the BC GUI.

*Resolution:* Perform one of the following:

- Hold down the **ALT** key and press **TAB** as necessary to display the query pop-up window. Look for the application with a steaming cup of coffee icon and titled “Java Plug In Security Warning.” With this pop-up security window displayed, answer the query question.
- Minimize all windows to view the pop-up security window and answer the query question.

## General problems

*Description:* Problems with BC server platform account login page and Java errors.

Types of problems include:

- The area for entering the Username and Password is missing from the BC server platform account login page, preventing login to the BC server platform.
- Java, Java Applet, JavaScript, or ActiveX errors are displayed, preventing display of the BC GUI.
- Only the BC GUI top header is displayed, and no information displays in the BC pages.
- Error message:

The Java2 Plug-In necessary to run this applet has not been installed

- Error message:

The Java Runtime Environment cannot be loaded

*Resolution:* Check the following:

- Ensure that a supported browser and JRE listed in the [Table 19](#) on page 47 are being used. If necessary, download and install the minimum supported JRE from the JREserver as described in “[Browsing to the BC GUI](#)” on page 68.
- Ensure that the Java Plug-in Control Panel is set up properly. See “[Java Plug-in Control Panel setup](#)” on page 64.
- If installing a new browser, an updated browser version, new JRE, or an updated JRE version, always:
  - a. Close all open browser windows.
  - b. Allow the browser or JRE installation to complete.
  - c. Open a new browser session and browse to the BC server platform.

If problems persist (such as lack of a display in the lower portion of the BC GUI), complete the following:

- Clear the browser and JRE cache as described in [Table 45](#) and refresh the browser to see if the problem clears; otherwise
- Verify that the browser is set up properly (see “[Setting up the Web browser](#)” on page 64 and “[Browser requirements and support](#)” on page 46).
- Reboot the browsing computer and browse to the BC server platform again.

**Table 45: Clearing the browser and JRE cache**

To clear cache for...	Use this procedure...
Internet Explorer	<ol style="list-style-type: none"> <li>1. Click <b>Tools &gt; Internet Options</b>.</li> <li>2. Click the <b>General</b> tab.</li> <li>3. Under <b>Temporary Internet files</b>, click <b>Delete Files</b>. Clicking <b>Delete all offline content</b> is not necessary.</li> <li>4. Click <b>Settings</b>.</li> <li>5. Click <b>Every visit to the page</b>.</li> <li>6. Click <b>OK</b>.</li> <li>7. Click <b>OK</b>.</li> </ol>
Mozilla	<ol style="list-style-type: none"> <li>1. Click <b>Edit &gt; Preferences</b>.</li> <li>2. In the Navigation pane, click <b>Advanced &gt; Cache</b>.</li> <li>3. Set cache to "0" MB.</li> <li>4. Click <b>Clear Cache</b>.</li> <li>5. Click <b>OK</b>.</li> <li>6. Click <b>Clear Disk Cache</b>.</li> <li>7. Click <b>OK</b>.</li> </ol>
JRE plug-in	<ol style="list-style-type: none"> <li>1. Open the Java Plug-in Control Panel.</li> <li>2. Click the <b>Cache</b> tab.</li> <li>3. If necessary, select <b>Enable Caching</b>.</li> <li>4. Click <b>Clear</b> or <b>Clear JAR Cache</b>.</li> <li>5. Deselect <b>Enable Caching</b>.</li> <li>6. Click <b>Apply</b>.</li> <li>7. Close the Java Plug-in Control Panel.</li> </ol>

## Inability to browse to the BC server platform

**Description:** Inability to browse to the BC server platform account login page.

The problem might be that the Domain Name Server (DNS) is not recognizing the BC server platform.

**Resolution:** To correct this problem:

1. Insert an "A" record (host record) and a pointer record (*PTR record* or a *reverse lookup record*) on the DNS server for the BC server platform.
2. For Dynamic Host Configuration Protocol (DHCP) environments, set a permanent lease and reservation for the BC server platform.
3. Ensure that the DNS is configured for DHCP Auto Registration.

**Alternate solution** An alternative solution is to modify the "Hosts" file on each browsing computer and the BC server platform.

---

**Note:** The BC server platform and host agent computers must share information to communicate with each other.

---

1. Locate the “Hosts” file, use:
  - Windows: %systemroot%\System32\Drivers\Etc
  - HP-UX and Solaris: /etc
  - Linux: /etc/hosts
2. Using a text editor, open the “Hosts” file and add a line to the end of the file that reflects the domain name format.  
For example:
 

```
11.22.33.44 MyComputer.roadrunner.acme.net
11.22.33.44 MyComputer
```
3. Save the file and exit the editor.

## Windows 2000 and Windows Server 2003 access problems

*Problem:* **Cannot access BC, even after uninstalling previous JRE versions.**

Multiple installations of a JRE on a browsing computer might inhibit browsing to the BC GUI, despite uninstalling previous versions.

*Resolution:* To correct this problem:

1. Click **Start > Settings > Control Panel**.
2. Double-click the Java plug-in icon from the Control Panel.
3. On the Java Plug-in Control Panel, click the **Advanced** tab.
4. Instead of “Use Java Plug-In Default,” click the correct plug-in and installation directory from the list.

*Problem:* **Cannot access the BC GUI when using high security Internet Explorer browsers.**

*Resolution:* To correct this problem:

1. Remove all existing JRE or Java Virtual Machine (JVM) installations that are listed in the Add/Remove Programs window.
2. If Netscape has been previously installed, uninstall the Netscape version.  
Netscape automatically installs a JRE that might interfere with Internet Explorer on Windows 2000 and Windows Server 2003 systems.
3. Because uninstalling Netscape does not uninstall the JRE, manually delete JRE subdirectories under the Java or JavaSoft directories:

```
C:\Program Files\java
C:\Program Files\javasoft
```

4. Exit Internet Explorer and close all browser windows.
5. Install a supported JRE.  
See “[Browsing to the BC GUI](#)” on page 68.
6. Reopen Internet Explorer and click **Tools > Internet Options**.
7. On the **Privacy** tab, ensure that the slider is set no higher than Medium-High.  
If the slider is missing, restore the slider by clicking **Default Level**. A minimum level of “cookie” acceptance is required by the BC server platform.
8. On the **Security** tab, ensure that the slider for the Internet Web content zone is set no higher than Medium.  
If the slider is missing, restore the slider by clicking **Default Level**.



## BC server platform reboot

**Description:** Error: The EVMsm service hung on starting.

If the BC server platform reboots, the system Event Log might display the above error. The EVMsm service does not actually hang.

**Resolution:** Ignore the message; no problem exists.

## Business Copy link is not presented within Insight Manager

BC does not register with Insight Manager when installed on a SMS. To obtain a BC link within the Insight Manager GUI, BC must be manually registered. To manually register BC with Insight Manager, complete the following:

1. Run the following commands from a DOS window on the SMS:

```
cd C:\Program Files\HP\System Insight Manager
mxtool -af tools\bc.xml
```

2. Verify that a **business copy** link displays in the Insight Manager GUI under **Tools > Storage Management**.

## Job errors and problems

This section lists errors that might display in a job log or Job Monitor status bar and general job problems. For more information on job planning and rules, refer to the BC Online Help & User Guide. Topics include:

- [Error: subsystem not known \(case-sensitive identifier\)](#), page 105
- [Error: could not map host/volume to physical storage](#), page 106
- [Error: storage command failed|<subsystem\\_name>| SCMI logical disk sharing](#), page 106
- [Error: the job name is too long](#), page 106
- [Error: operation uses multiple subsystems, but no matching SET CA\\_SUBSYSTEM found](#), page 106
- [Error: cannot do discrete unmount on a volume group](#), page 106
- [Error: cannot present a BCV that is already presented to the fabric](#), page 106
- [Error: mount point not found](#), page 106
- [Error: cannot do discrete unmount on a multi-partition disk](#), page 106
- [Error: /dev/fcd\\* not found failure: device with LUNWWID: "...-xxx" wasn't found in system](#), page 107
- [Using MOUNT\\_SINGLE with a VG that contains no logical volumes causes the BC job to fail](#), page 107
- [General job failures](#), page 107

### Error: subsystem not known (case-sensitive identifier)

**Description:** BC jobs containing EVA storage systems fail if an EVA storage system name contains a space at the end.

**Resolution:** Remove the space at the end of the EVA storage system name.

### Error: could not map host/volume to physical storage

*Description:* Mixing VOLUME and UNIT syntax in a job is not valid. Although BC allows the mixing of VOLUME and UNIT syntax in a job that passes validation, the job fails to run.

*Resolution:* Change the job to use VOLUME or UNIT syntax exclusively.

### Error: storage command failed| <subsystem\_name>| SCMI logical disk sharing

*Description:* If executing overlapping SNAPCLONE jobs against the same source, the second job might fail because the SNAPCLONE created by the first job did not complete the normalization process. EVA storage systems support only one simultaneous SNAPCLONE on a given device.

*Resolution:* Allow the first SNAPCLONE to fully normalize before running the second job or include a NORMALIZE operation as the first step of the second job.

### Error: the job name is too long

*Description:* The maximum length of 128 characters for a job name was exceeded.

*Resolution:* Reduce the number of characters in the job name.

### Error: operation uses multiple subsystems, but no matching SET CA\_SUBSYSTEM found

*Description:* This error can occur for the following reasons:

- The job is using storage systems in a Continuous Access EVA environment and the SET CA\_SUBSYSTEM operation is not specified or specified incorrectly.
- The SET CA\_SUBSYSTEM operation points to an invalid storage system.

*Resolution:* Check that you have the correct number of SET CA\_SUBSYSTEM. Check that you did not mistype the subsystem name or select an invalid subsystem name.

---

**Note:** MA/EMA storage systems are not valid in a Continuous Access EVA environment.

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### Error: cannot do discrete unmount on a volume group

*Description:* Volume groups are *not* supported for the UNMOUNT operation.

*Resolution:* Rewrite the job without using the UNMOUNT operation.

### Error: cannot present a BCV that is already presented to the fabric

*Description:* A BCV cannot be presented more than once in the SAN fabric.

*Resolution:* Rewrite the job.

### Error: mount point not found

*Description:* This error occurs during job validation if a SNAP or CLONE VOLUME operation refers to a source volume that does not exist.

*Resolution:* Check the source volume in question.

### Error: cannot do discrete unmount on a multi-partition disk

*Description:* A job using the UNMOUNT operation is pointing to a multi-partition disk.

*Resolution:* The UNMOUNT operation does not support multi-partition disks. Rewrite the job.

## Error: /dev/fcd\* not found failure: device with LUNWWID: "...-xxx" wasn't found in system

**Note:** This error message can be generated for multiple reasons. A typical condition and resolution are provided here.

**Description:** This error message displays in the BC GUI status bar on the Jobs page (when the job is highlighted) and the View Job Details page, and is entered in the job log file.

On a given HSG80 controller pair, BC requires that all host connections for a given physical host have the same offset value. Connections for other physical hosts are allowed different offsets.

**Resolution:** Using the HSG Element Manager, change the HSG controller pair configuration to use an identical offset value on each host connection associated with a given physical host.

## Using MOUNT\_SINGLE with a VG that contains no logical volumes causes the BC job to fail

**Description:** When replicating a VG that contains no logical volumes and attempting to mount the VG as RAW, specifying MOUNT\_SINGLE and specifying the "BCV component" to be the name of the VG causes the BC job to fail.

**Resolution:** Edit the BC job:

1. Change MOUNT\_SINGLE to MOUNT\_ALL.
2. Change the BCV\_component to "N/A" instead of naming the VG.
3. Save the job.

## General job failures

**Description:** **Job failed and you cannot undo the job.**

If the configuration of a storage system is changed (external to BC) while jobs are running, the changes might cause the jobs to fail. In some cases, the ability to undo jobs that fail in this manner might be impaired and require a manual cleanup of the storage configuration.

**Resolution:** To prevent this problem:

- Ensure that the storage configurations remain stable while running BC jobs.
- Always perform a manual BC storage refresh after making changes to the storage configuration to update the affected storage system.
- Enter the following command at the command prompt:

```
evmcl.exe <BC_server_platform_name or IP_address> RESET <job_name>
```

**Description:** **Undo job is not failing when it should be failing.**

**Resolution:** No resolution for this behavior in this release. BC ignores the *check\_results*, *result\_type*, and *result\_value* "True" and "False" parameters in the LAUNCHUNDO operation and never fails a job during undo.

**Description 1:** **Job failed.**

Have you recently manually deleted or modified an MA/EMA clone?

BC maintains a record of resources used for all MA/EMA clone operations on the BC server platform. If the corresponding .sto file for the clone device was not manually deleted, jobs associated with MA/EMA storage systems might fail.

*Resolution 1:* Go to the following directory and delete the .sto file associated with the clone device:

`<Program Files>\Compaq\SANworks\Enterprise Volume Manager\bin`

*Description 2:* **Job failed.**

*Applies to:* VGs used in HP-UX, Tru64 UNIX, AIX, Linux, and OpenVMS and a job with more than one BCV.

BC jobs that involve the above OSs using VGs and the creation of more than one BCV require a specific sequence of operations.

*Resolution 2:* Use the format sequence: SNAP, SNAP, MOUNT, MOUNT (instead of SNAP, MOUNT, SNAP, MOUNT). Basically, separate the MOUNT steps from the BCV creation steps (SNAP, CLONE, NORMALIZE, or SPLIT). Refer to the job templates on the Job Create page for examples of step sequences associated with the most common job types.

*Description 3:* **Job failed.**

Did you create a job where you manually typed a unit number or virtual disk name in a SNAP UNIT, SPLIT UNIT, or MOUNT UNIT operation?

*Resolution 3:* Check to ensure that these entries are correct and valid. Inappropriate choices can lead to job failures.

*Description 4:* **Job failed.**

Do all BCV variable names in the job begin with a dollar sign (\$)?

*Resolution 4:* BC requires the dollar sign character (\$) when specifying the name of a BCV variable. For example, \$sales\_bcv and \$hr\_snap\_Oct2003 are valid entries.

## BC GUI behaviors

This section describes issues that can arise from BC GUI behaviors. Topics include:

- [Job Monitor page—percentage complete bar](#)
- [BC GUI takes a long time loading](#)
- [Login page displays after refresh](#)
- [Slow GUI response times while jobs are running](#)
- [BC GUI stops updating](#)

### Job Monitor page—percentage complete bar

*Description:* Sometimes the step-percent-complete bar on the Job Monitor page drops from a large percentage to a smaller percentage.

*Explanation:* This change does not necessarily indicate a problem. For example, a clone normalization step might reach 100% and then decrease when two jobs that normalize the same unit are both running. Because BC displays the average percent complete of all mirror members, the step-percent-complete bar in one job drops to a smaller percentage when the second job begins normalization.

## BC GUI takes a long time loading

*Description:* Loading the BC GUI takes a long time.

*Explanation:* The BC GUI makes extensive use of Java applets. When a new Web browser session is established, applets can take a minute or more to download depending on current network conditions. After the applets are downloaded, they remain stored in the Web browser memory cache until a new browser session is established. The number of storage systems can also affect the time required to load the GUI.

## Login page displays after refresh

*Description:* BC server platform account login page displays while working in the BC GUI.

*Explanation:* A time-out occurs when the BC GUI remains inactive for 15 minutes, displaying the Login page. A `Refresh Browser` message in the Running Jobs window indicates this fault. Information not saved before the refresh is lost.

## Slow GUI response times while jobs are running

*Description:* BC GUI responsiveness depends on the number of currently running jobs and the configuration size in terms of the number of storage systems and BC-enabled hosts. In extreme cases, the GUI can take up to 30 seconds to respond to requests that involve creating or editing jobs.

*Resolution:* Perform all job creation and maintenance operations during periods when no jobs are running.

---

**Note:** Unassigned hosts in Command View EVA prevent BC from determining host connection information.

---

## BC GUI stops updating

*Description:* While running a BC job, serious problems with the Fibre Channel connection to the BC server platform can prevent the BC GUI from updating properly.

*Resolution:* Correct any Fibre Channel connection problems that exist. Then restart the BC GUI and refresh the browser session to begin seeing BC GUI updates again.

## BC GUI resource display problems

This section describes problems related to resources not displaying in the BC GUI. Topics include:

- [BC-enabled host icon displays red during BC update](#), page 110
- [Storage systems do not display in the Resources page when using a remote storage manager](#), page 110
- [BC-enabled hosts not displaying](#), page 110
- [BC-enabled host does not display volume information](#), page 111
- [Storage systems are not displayed](#), page 111
- [EVA drive letter not displayed in CLONE operation](#), page 111

## BC-enabled host icon displays red during BC update

**Description:** When upgrading the BC server software version from BC v2.2 to BC v2.3, the BC v2.3 server job resource applet changes the color of all BC v2.2-enabled host icons from green to red. Also, because the browsing computer probably uses a cached BC v2.2 applet, the host icons change to a question mark (?) icon instead of the expected red icon.

**Resolution:** To resolve these issues, HP recommends occasionally clearing the browsing computer Web browser and JRE caches. Because the BC v2.2-enabled hosts were not yet upgraded to BC v2.3, clearing the caches changes the question mark icon to the expected red icon. Upgrading each BC-enabled host changes the red host icon to green.

---

**Note:** Only a green icon allows the BC-enabled host to be used in BC jobs; red icons prevent the use of this BC-enabled host in a BC job.

---

## Storage systems do not display in the Resources page when using a remote storage manager

**Description:** When the BC server and a storage manager are not locally installed on the same host, remote access must be established between BC and the applicable storage managers.

**Resolution:** Establish remote access between the BC server and the applicable storage managers. See [“Establishing storage manager remote access”](#) on page 84.

## BC-enabled hosts not displaying

**Description:** A BC-enabled host does not display in the Resources page or the host displays in the Resources page, but does not present any volume information.

The bidirectional communication between the BC server and the individual BC-enabled host is accomplished through an encrypted TCP socket interface. For this communication interface to work properly, the following must be true:

- Each BC-enabled host must be able to resolve the network name or IP address of the BC server platform.
- The BC server platform must be able to resolve the network name or IP address for each BC-enabled host.

Given the wide variety of possible network configurations, the default methods used by BC to establish this communications interface might not always work properly. Assuming that BC is installed and running properly on the host, the most likely reason is that this BC-enabled host cannot communicate with the BC server platform using the network name or IP address entered during the BC host agent software installation.

**Resolution:** To correct this problem:

1. Using *ping*, *nslookup*, or another network utility, determine the network name or IP address that the BC-enabled host should use to communicate with the BC server platform.
2. Stop the Switchboard service on the BC-enabled host (see [“Stopping/starting BC-enabled host service”](#) on page 78).
3. Open the `sb.ini` file in the `../CPQevm/bin` or `../Enterprise Volume Manager/bin` directory.
4. Change the `APPL_NAME` field to the name determined in [step 1](#).
5. Save the file.
6. Restart the Switchboard service/daemon/process (see [“Stopping/starting BC-enabled host service”](#) on page 78).

## BC-enabled host does not display volume information

**Description:** Host volume information does not display on the Resources page.

For this problem, the BC-enabled host can communicate with the BC server platform, but the BC server cannot communicate with the BC-enabled host. By default, the BC server uses the NetBios name of the BC-enabled host. In some cases, the BC server platform cannot communicate with the BC-enabled host using this name.

**Resolution:** In the `sb.ini` file on the BC-enabled host, two optional fields are listed: `NEWHOSTNAME` and `SHOWFQDN`. By default, both are set to zero. Solve the problem using one of two ways:

- Set the `SHOWFQDN` field to “1” to allow the BC server to use the Fully Qualified Domain Name of the BC-enabled host, or
- Use the `NEWHOSTNAME` field to specify the BC-enabled host IP address or any other name that might work.

In a workgroup environment, the following file on the BC server platform might require editing: `%System%\WINNT\System32\Drivers\etc\Hosts`

## Storage systems are not displayed

**Description:** Storage systems are not displayed on the Resources page.

- Resolution:**
- Check the HSG Element Manager and Command View EVA displays to verify that applicable storage systems are being presented to BC. Also, ensure that these storage systems are zoned for the appropriate BC server platform.
  - If using EVA storage systems, are they displayed as expected?  
If not, were passwords changed on the BC server platform account login page, but not changed on the BC utilities page? If necessary, see [“Synchronizing passwords between BC and storage managers”](#) on page 82.
  - If using MA/EMA storage systems, have the disks been initialized?  
BC must know the capacity of an HSG disks before determining if the disk can be used for a clone or snapshot. Unused HSG disks that have not been initialized do not report a capacity and cannot be used by BC. Ensure that all unused disks have been initialized with the HSG CLI `INITIALIZE` command.

## EVA drive letter not displayed in CLONE operation

**Description:** EVA storage systems are displayed on the Resources page, but the drive letter is not displayed in the `CLONE` step when editing an existing MA/EMA job.

**Resolution:** The `CLONE` operation is *not* supported on EVA storage systems. When migrating jobs with databases from EVA storage systems to EVA storage systems, the existing MA/EMA job cannot be edited; the job must be re-created using the `SNAP` or `SNAPCLONE` operation. See [“Migrating MA/EMA BC jobs to use EVA storage systems”](#) on page 82 or refer to the BC Online Help & User Guide for more information.

## BC server hangs with Continuous Access EVA v1.1a

This section describes a BC server hang problem when using the BC server on an SMA with Continuous Access EVA.

**Description:** Installing HP StorageWorks Continuous Access User Interface v1.1a on a BC server platform might cause the BC server to hang.

**Resolution:** Refer to the *HP StorageWorks Continuous Access User Interface v1.1a Release Notes* (T3031–98402) for additional information.

## Uninstalling the BC server software from an SMA error

*Description:* Attempting to uninstall the BC server software from an SMA using the Windows Add/Remove Programs feature generates an error condition. The error message indicates that the BC server software must be removed using the SMA software GUI.

*Resolution:* Access the SMA GUI and select **Settings > Maintenance > Remove Software** to display a screen for uninstalling “Business Copy Server” from the SMA.

---

**Note:** Use the Add/Remove Programs to remove the BC server software from an SMS.

---



## All OSs: BC-enabled host limitations and problems

This section describes BC-enabled host problems applicable to all BC supported OSs. Topics include:

- [Error: remote spawn request has timed out](#)
- [Error: mount operation timed out](#)
- [Mount failure on MA/EMA storage systems](#)
- [Host icon displays as red on the Resources page](#)
- [Inability to insert text in fields on Job Create page](#)

### Error: remote spawn request has timed out

*Description:* A BC-enabled host process took too long to complete.

*Applies to:* Jobs containing LAUNCH, LAUNCHUNDO, SUSPEND, or RESUME operations.

BC jobs can time out and report this error if a process spawned by a BC job containing a LAUNCH, LAUNCHUNDO, SUSPEND, or RESUME operation does not complete within 30 minutes.

*Resolution:* Ensure that the process is not hung and that BC has a valid reason for taking more than 30 minutes to complete. If necessary, increase the time-out value by modifying the `sb.ini` file on the appropriate BC-enabled host as follows:

1. Ensure that no BC jobs that involve the host are running.
2. Stop the Switchboard service on the host (see [“Stopping/starting BC-enabled host service”](#) on page 78).
3. Open the host `sb.ini` file in a text editor.
4. Modify the `PIPE_READ_TIMEOUT` value, entering the time in seconds.
5. Save the file.
6. Restart the host service/daemon/process (see [“Stopping/starting BC-enabled host service”](#) on page 78).

### Error: mount operation timed out

*Description:* A mount operation took too long to complete.

BC jobs can time out and report this error if a MOUNT process does not complete within 6,000 seconds.

*Resolution:* Ensure that the process is not hung and that BC has a valid reason for taking more than 6,000 seconds to complete. If necessary, increase the time-out value by modifying the `evm2.ini` file on the BC server platform as follows:

1. On the BC server platform, open the `evm2.ini` file in a text editor.

Locate this file in the following directory:

- For SMA:

`C:\Program Files\Compaq\SANworks\Enterprise Volume Manager\bin`

- For SMS:

`<Program Files>\Hewlett-Packard\Business Copy\bin`

2. Modify the mountTimeout value, entering the time in seconds.



**Caution:** Ensure that no BC jobs are running before performing the next step.

---

3. Save the file.
4. Restart the BC server (see “[Stopping/starting the BC server](#)” on page 78).

## Mount failure on MA/EMA storage systems

*Description:* Mount failures can occur on BC-enabled hosts that have mixed offset entries.

*Resolution:* All entries in the HSG80 host connection table for a given BC-enabled host must use the same unit offset.

## Host icon displays as red on the Resources page

*Description:* The BC server determined that the BC-enabled host is either *not* a supported version or *not* reporting a version. This host cannot be used in BC jobs.

*Resolution:* Update the BC-enabled host to a supported version. See also “[BC-enabled host icon displays red during BC update](#)” on page 110.

## Inability to insert text in fields on Job Create page

*Description:* Inability to insert text in the Name, Owner, and Category fields on the Job Create page.

OSs with Mozilla browsers might experience a problem entering data in specific fields of the Job Create page. This intermittent problem is a known bug in the Sun Microsystems Bug Database.

*Resolution:* Use the mouse to change *focus* away from the data entry field to a non-applet area of the window. For example, move the *focus* away from the applet area by clicking in the upper header area of the BC GUI and then clicking back within the applet area to regain focus on the text fields.

## HP-UX—BC-enabled host limitations and problems

This section describes BC-enabled HP-UX host limitations and known problems. Topics include:

- [Error: BCV\\_component not found on source host](#), page 115
- [Error: no usable mount connections found](#), page 115
- [Error: no suitable LUN could be chosen](#), page 115
- [Error: device with “LUNWWID...-xxx” wasn’t found in system](#), page 116
- [Host volumes do not display in the BC GUI](#), page 116
- [Error: remote spawn request failed](#), page 116
- [BCV not persisted after host reboot](#), page 117
- [Job failure: using volume groups](#), page 117
- [Job failure: mounting raw logical volumes](#), page 117

### Error: BCV\_component not found on source host

*Description:* Some existing BC jobs might fail to run after updating BC because logical volume names are now being reported differently by the BC-enabled host.

*Resolution:* To resolve this problem, edit the BC job MOUNT operation by re-selecting the BCV component listed in the drop-down list and saving the job.

### Error: no usable mount connections found

*Description:* The MA/EMA array controller does not maintain active or “online” connections to a HP-UX host unless a LUN is presented to that host at all times.

*Resolution:* To prevent this problem, ensure that at least one LUN is presented to all HP-UX hosts to act as a mount-on host for BC jobs.

### Error: no suitable LUN could be chosen

*Description:* The default HP-UX host configuration supports 32 LUNs (0 to 31) per target. With the default setting, BC cannot create LUNs outside this range. However, if LUNs in this range are already being used by other devices, BC jobs might fail.

*Resolution:* No practical limit exists to the LUN range that the host can support. The 0 to 31 limit was chosen because LUNs outside this range are not supported by many combinations of OS version, array controller, host mode, and Secure Path version. The BC-imposed limit can be increased as desired by changing the MAXLUN parameter in the `osvm.ini` file, located in the `../opt/CPQevm/bin` directory.

---

**Note:** Users are responsible for ensuring that the chosen MAXLUN value is supported by the OS, array controller, HBA, driver, and Secure Path version.

---

## Error: device with “LUNWWID...-xxx” wasn’t found in system

*Description:* This error message is due to a problem with Secure Path. This error affects mount operations and prevents the HP-UX host from recognizing the BCV devices.

*Resolution:* Reboot the host. Also, keep a delay of at least six minutes between the end of the undo phase of a job and the start of the next job on the same host.

## Host volumes do not display in the BC GUI

*Description:* BC relies on Secure Path to detect newly presented LUNs. When LUNs temporarily become unavailable, for example due to a network glitch or hardware fault, Secure Path may not detect when they are available again and does not reattach them to the host. Host volumes that include unattached LUNs are not displayed in the BC GUI.

*Resolution:* Complete the following process to reattach a LUN:

1. From the HP-UX host command line, enter:

```
spmgr display -u
```

Secure Path provides a list of all unattached LUNs.

2. From the HP-UX host command line, using the host CLI and applicable “unattached LUN” information obtained from Secure Path, enter:

```
spmgr add <LUN WWID>
```

3. From the BC GUI Resources page, refresh the host.

The reattached LUN becomes presented by Secure Path and displays on the Resources page.

## Error: remote spawn request failed

*Description:* A job that contains the VG name fails when the job reaches the FREEZE step and displays the above error on the View Job Details page. Note that this problem did not exist in the EVM 2.0x host agent version.

When the UNMOUNTVGSOURCE variable is set to “true,” BC jobs cannot replicate:

- A VG by the VG name; the job must snap a VG member (logical volume) by name.
- A raw VG.

*Resolution:* If a BC job containing a VG name fails, check to see if the MOUNTVGSOURCE variable is set to “true”; consider changing the setting to “false.” BC jobs generally execute more quickly when the UNMOUNTVGSOURCE parameter is set to “false,” because the jobs will not unmount affected mount points nor perform any volume group exports. However, this method does not guarantee data integrity or availability, because mount points and volume groups remain active during the creation of the point-in-time copy.

To replicate a VG, select one of the VG members (logical volumes/mount points) within the VG to be replicated. This selection method will replicate each of the logical volumes in the VG.

## BCV not persisted after host reboot

*Description:* A BCV mounted by BC does not persist across a HP-UX host reboot.

HP-UX hosts require the kernel to be rebuilt in order for mounted devices to persist across a reboot. Due to the potentially disruptive nature of this operation, BC does not rebuild the kernel.

*Resolution:* To make BCV devices automatically mount in the event of a reboot, rebuild the kernel.

## Job failure: using volume groups

*Description:* **BC job using VGs failed.**

Check to ensure that you are not running simultaneous BC jobs that are replicating the same VG. Part of the process for replicating an HP-UX VG involves placing the source VG into a consistent state. BC does this through the `VGfreeze` utility. If multiple `VGfreeze` processes are executed against the same VG simultaneously, one or more processes fail, causing the BC job to fail.

*Resolution:* Reschedule the jobs for different times.

*Description:* **BC job mounting a clone or snapshot failed.**

Another problem that can cause jobs to fail is mounting a clone or snapshot copy of an HP-UX 11i v1 VG onto an HP-UX 11i v2 host, and vice versa. Although BC allows configuring a job this way, the job fails when run.

*Resolution:* Check the version levels of each host.

## Job failure: mounting raw logical volumes

*Description:* Mounting multiple raw logical volumes per VG causes problems during job execution and job undo. A single raw mount will make all logical volumes in the VG available. Attempting to mount multiple raw LVs per VG causes problems during job execution and job undo.

*Resolution:* Do not create BC jobs that attempt to mount more than one raw logical volume per VG. A single raw mount makes all logical volumes in the VG available. This limitation applies only to raw logical volumes.

## OpenVMS—BC-enabled host limitations and problems

This section describes BC-enabled OpenVMS host limitations and known problems. Topics include:

- [Job failure](#)
- [BC software is not functioning on the BC-enabled host](#)
- [Adding a cluster qualifier in a BC job has no affect](#)
- [Adding the /NODE qualifier to mount a BCV on specific node within cluster](#)
- [Adding the /OVERRIDE=ID qualifier to mount a BCV](#)
- [Removing BC from a non-impersonator node of a non-shared system disk cluster](#)

### Job failure

*Description:* If the cluster node running the BC host agent software fails during the execution of a job, that job fails.

*Resolution:* Undo the job and then re-execute the job.

### BC software is not functioning on the BC-enabled host

*Description:* BC starts only on the node acting as the cluster impersonator. If this node fails, the impersonator and BC host agent software automatically move to another node. However, BC jobs continue to fail unless the BC failover watchdog was enabled.

*Resolution:* Return the node to service and ensure that the node has regained the cluster impersonator role. For more information, see “[OpenVMS clusters](#)” on page 58.

### Adding a cluster qualifier in a BC job has no affect

*Description:* If a MOUNT operation is performed to a cluster, the mount occurs on all cluster members.

*Resolution:* None.

### Adding the /NODE qualifier to mount a BCV on specific node within cluster

*Description:* If a BCV mount is performed on a specific cluster node, specify the System Communications Services (SCS) node name with /NODE qualifier.

*Resolution:* Ensure that BC host agent software is installed properly. The node name should be the SCS node name. To display node names in SCS format, use the `SHOW CLUSTER` command.

### Adding the /OVERRIDE=ID qualifier to mount a BCV

*Description:* Job mounts fail while using the /OVERRIDE=ID qualifier.

*Resolution:* Do not abbreviate the /OVERRIDE=ID qualifier.

### Removing BC from a non-impersonator node of a non-shared system disk cluster

*Description:* When BC is removed from a non-impersonator node of a non-shared system disk cluster, EVMCL deletes the cluster from the BC GUI Resources page.

*Resolution:* Restart the BC process on the impersonator node to rediscover and present the cluster to the BC GUI.

## Tru64 UNIX—BC-enabled host limitations and problems

This section describes BC-enabled Tru64 UNIX host limitations and known problems. Topics include:

- [Error: pipe read timeout/OSVM hanging/mount operation time out](#)
- [Error: SCSI CAM driver](#)
- [Error: OSVM is hanging; pipe read error!](#)
- [Error: host has utility locked](#)
- [Job failure: using volume groups](#)

### Error: pipe read timeout/OSVM hanging/mount operation time out

**Description:** This problem applies to BC jobs with large configurations (for example, an AdvFS domain with 64 filesets spread over 8 LUNs). The scan disk command (`hwmgr -scan scsi`) for Tru64 UNIX might take more time than the value specified in `PIPE_READ_TIMEOUT`. This time limitation can cause the BC job to fail.

Similarly, during a mount operation, methods in the Tru64 UNIX STOCFG library and the `voldg flush` command can take a long time to return, causing the BC job to fail.

**Resolution:** Follow these steps:

1. Undo the BC job.
2. Remove the mount points on the host where the volume is mounted.
3. If possible, reboot the BC-enabled host on which the mount operation was performed.
4. Rerun the BC job.

### Error: SCSI CAM driver

**Description:** During AdvFS domain replication operations, certain recoverable events might generate SCSI CAM driver errors.

These errors are recoverable if the `AdvfsIORetryControl` parameter is not set to the default value of zero. This default setting *does not* attempt retries and can result in domain panic.

**Resolution:** To prevent domain panic, set `AdvfsIORetryControl` to a value greater than zero. HP recommends setting this parameter to “1.”

Check the current `AdvfsIORetryControl` setting using the following command:

```
/sbin/sysconfig -q advfs AdvfsIORetryControl
```

Change the setting using the following command:

```
/sbin/sysconfig -r advfs AdvfsIORetryControl=nn
```

Where `nn` equals the number of AdvFS retries.

This problem is described further in Quality Assurance Review (QAR) 93940.

## Error: OSVM is hanging; pipe read error!

*Description:* An LSM configuration with eight LUNs on an MA/EMA storage system sometimes fails to mount on a Tru64 UNIX cluster. During a MOUNT operation in a BC job, LSM commands hang on the cluster. As a result, the job fails to mount. This problem might not be reproducible every time the BC job runs.

*Resolution:* Undo the job and then rerun the job again. To prevent this problem from reoccurring, reduce the number of LUNs in the configuration to between four and six.

## Error: host has utility locked

*Description:* `<host_name>` has this utility locked. Use the `-1` option, if safe, to override.

*Applies to:* Tru64 UNIX using LSM in a clustered environment.

This error may occur in environments where multiple processes are using the same `volclonedg` script for different nodes. Tru64 UNIX locks the script by creating a soft link (for example, `/etc/vol/lsmclonelock`) that points to the processing cluster node.

*Resolution:* To remove the lock:

1. On the BC-enabled host, run:

```
volclonedg -1
```

2. Confirm that the lock is removed by running:

```
ls /etc/vol/smclonelock
```

The response should be:

```
ls: /etc/vol/lsmclonelock not found
```

## Job failure: using volume groups

*Description:* BC job using VGs failed.

Part of the process of replicating an AdvFS domain involves placing the source VG into a consistent state. BC does this through the `VGfreeze` utility. If multiple `VGfreeze` processes are executed against the same VG at the same time, one or more processes fail, causing the BC job to fail.

*Resolution:* Reschedule the jobs for different times.



## AIX—BC-enabled host limitations and problems

This section describes BC-enabled AIX host limitations and known problems. Topics include:

- [Job failure: using volume groups](#)
- [Job failure: mounting raw logical volumes](#)
- [Error: remote spawn request failed](#)

### Job failure: using volume groups

*Description:* BC job using VGs failed.

Part of the process of replicating an AIX VG involves placing the source VG into a consistent state. BC does this through the `VGfreeze` utility. If multiple `VGfreeze` processes are executed against the same VG simultaneously, one or more processes fail, causing the BC job to fail.

*Resolution:* Reschedule the jobs for different times.

### Job failure: mounting raw logical volumes

*Description:* Mounting multiple raw logical volumes per VG causes problems during job execution and job undo. A single raw mount will make all logical volumes in the VG available. Attempting to mount multiple raw LVs per VG causes problems during job execution and job undo.

*Resolution:* Do not create BC jobs that attempt to mount more than one raw logical volume per VG. A single raw mount makes all logical volumes in the VG available. This limitation applies only to raw logical volumes.

### Error: remote spawn request failed

*Description:* A job that contains the VG name fails when the job reaches the `FREEZE` step and displays the above error on the View Job Details page. Note that this problem did not exist in the EVM 2.0x host agent version.

When the `UNMOUNTVGSOURCE` variable is set to “true,” BC jobs cannot replicate:

- A VG by the VG name; the job must snap a VG member (logical volume) by name.
- A raw VG.

*Resolution:* If a BC job containing a VG name fails, check to see if the `MOUNTVGSOURCE` variable is set to “true”; consider changing the setting to “false.” BC jobs generally execute more quickly when the `UNMOUNTVGSOURCE` parameter is set to “false,” because the jobs will not unmount affected mount points nor perform any volume group exports. However, this method does not guarantee data integrity or availability, because mount points and volume groups remain active during the creation of the point-in-time copy.

To replicate a VG, select one of the VG members (logical volumes/mount points) within the VG to be replicated. This selection method will replicate each of the logical volumes in the VG.

## Linux—BC-enabled host limitations and problems

This section describes BC-enabled Linux host limitations and known problems. Topics include:

- [Error: physical volumes “/dev/sdr” and “/dev/sdp” are in different volume groups](#)
- [Error: VGDA in kernel and lvmtab are not consistent](#)
- [Error: vgimport -- ERROR “pv\\_read\(\): read” reading physical volume](#)
- [Error: fsck.ext2: Attempt to read block from filesystem resulted in short read while trying to open](#)
- [Error: no suitable LUN could be chosen](#)
- [Device properties page displays all zeroes in LUNWWID](#)
- [BC-enabled host daemon does not start](#)

### Error: physical volumes “/dev/sdr” and “/dev/sdp” are in different volume groups

*Description:* The Linux OS *does not* provide built-in LUN persistence. If adding or deleting physical LUNs or disks to a system, a probability exists where device mnemonics might change in an undesirable way.

When BC scans for the new devices, the device mnemonics for the VG might change, shuffling between the source VG and target VG and causing the BC job to fail.

*Resolution:* Change the job to avoid mounting VG-based BCVs on the same host as the source.

### Error: VGDA in kernel and lvmtab are not consistent

*Description:* This error message occurs only when the LVM is inconsistent with the kernel.

The VGDA is Volume Group Descriptor Data that holds the necessary metadata to handle LVM functionality. This data is stored at the beginning of each disk. Because the Linux LVM is not as stable as UNIX OSs, if the LVM is not in a good operating state, then BC jobs fail on a host containing VG type BCVs.

*Resolution:* To recover from this error:

1. Undo the job.
2. Reboot the host.
3. Rerun the job.

The job should execute successfully.

### Error: vgimport -- ERROR “pv\_read(): read” reading physical volume

*Description:* Only VG type jobs fail with this error. This error message occurs only when multiple device files exist for a single LUN, caused when the driver is loaded as single path, but the SAN is configured for multipath.

*Resolution:* Reload the driver in failover mode and rerun the job.

## Error: fsck.ext2: Attempt to read block from filesystem resulted in short read while trying to open

*Description:* Only *non-VG* type jobs fail with this error. This error message occurs only when multiple device files exist for a single LUN, caused when the driver is loaded as single path, but the SAN is configured for multipath.

*Resolution:* Reload the driver in failover mode and rerun the job.

## Error: no suitable LUN could be chosen

*Description:* The default Linux host configuration supports 32 LUNs (1 to 32) per target. With the default setting, BC cannot create LUNs outside this range. However, if LUNs in this range are already being used by other devices, BC jobs might fail.

*Resolution:* No practical limit exists to the LUN range that the host can support. The 1 to 32 limit was chosen because LUNs outside this range are not supported by default by the platform-kit. The BC-imposed limit can be increased as desired by changing the MAXLUN parameter in the `osvm.ini` file located in the `../opt/CPQevm/bin` directory, and also changing the LUNEND parameter in the `probe-luns` file located in `/opt/hp/hp_fibreutils` directory.

---

**Note:** Users are responsible for ensuring that the chosen MAXLUN value is supported by the OS, array controller, and HBA driver.

---

## Device properties page displays all zeroes in LUNWWID

*Description:* When an UNDO of a snap mount job completes, the unmounted device displays in the BC GUI Resources page with the LUNWWID field indicating all zeroes.

*Resolution:* Rebooting the BC-enabled host clears this error.

## BC-enabled host daemon does not start

*Description:* The BC host agent software installation expects to find the standard C++ library on the Linux host (32-bit or 64-bit hosts). The standard C++ library is not part of the default Linux OS installation. If this library is not installed prior to the BC host agent software installation, the daemons functionality for this BC-enabled host will not work properly.

*Resolution:* Ensure that the standard C++ library is installed on the Linux host prior to installing the BC host agent software. Installing the library after the BC host agent software requires a manual restart of the daemons.

For example, Red Hat Enterprise Linux AS 3.0 uses these C++ library files from the OS installation CD:

- `compat-libstdc++-7.3-2.96.123.i386.rpm` for 32-bit processors
- `compat-libstdc++-7.3-2.96.123.i686.rpm` for 64-bit processors

## Solaris—BC-enabled host limitations and problems

This section describes BC-enabled Solaris host limitations and known problems. Topics include:

- [Mounted BCV persistence across host reboots](#)
- [Job failure: mounting raw partitions](#)

### Mounted BCV persistence across host reboots

*Description:* BCVs are mounted automatically after reboot of the BC-enabled host.

By default, when BC mounts a BCV on a Solaris host, the BCV device file is added to the `/etc/vfstab` file during job execution and removed during job undo. The intent of this activity is to allow any currently mounted BCVs to be mounted automatically in the event of a host reboot. The `OSVM.ini` file in the host `/opt/CPQevm/bin` directory provides a way to disable this functionality.

*Resolution:* To prevent modification of the `/etc/vfstab` file, change the `EDIT_MOUNT_TABLE` setting to “False.”

### Job failure: mounting raw partitions

*Description:* Mounting multiple raw logical volumes per Disk Group (DG) causes problems during job execution and job undo. A single raw mount will make all logical volumes in the DG available. Attempting to mount multiple raw LVs per DG causes problems during job execution and job undo.

*Resolution:* Do not create BC jobs that attempt to mount more than one raw logical volume per DG. A single raw mount makes all logical volumes in the DG available. This limitation applies only to raw logical volumes.

## Windows—BC-enabled host limitations and problems

This section describes BC-enabled Windows host limitations and known problems. Topics include:

- [Error: using MOUNT VOLUME\\_ALL](#), page 125
- [System settings change pop-up](#), page 125
- [Drive letter and disk number assignments do not persist through a BC-enabled host reboot](#), page 125
- [Mounts and dismounts fill up the Event Log](#), page 126
- [Mounting problems](#), page 126
- [Applications restrict access or require privileges](#), page 128
- [Mapped network drive problem in Windows Server 2003](#), page 128
- [Extra disk icon with question mark displays in Windows Server 2003, Windows Explorer view](#), page 128

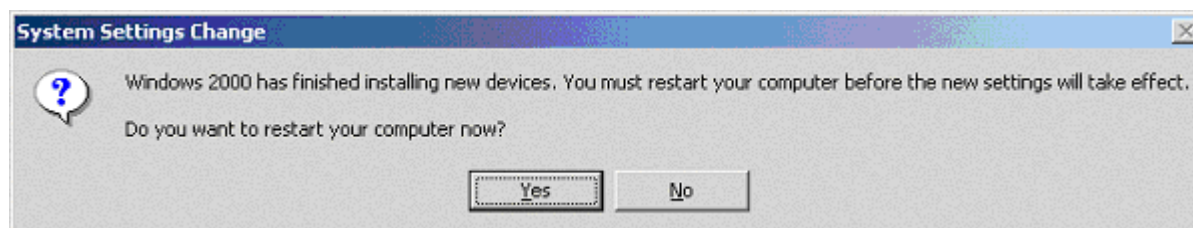
### Error: using MOUNT VOLUME\_ALL

*Description:* MOUNT VOLUME\_ALL does not work on Windows hosts and causes job failures. MOUNT\_SINGLE is supported.

*Resolution:* Do not use the MOUNT VOLUME\_ALL operation for mounting on a Windows host.

### System settings change pop-up

*Description:* When BC mounts a BCV, Windows intermittently displays a pop-up window. This pop-up window is modal and must be acknowledged before additional MOUNT operations can complete. In the case of multiple mount operations, drive letters might be assigned incorrectly.



**Figure 10: System Settings Change pop-up window**

*Resolution:* To prevent this problem, *do not* log in to the desktop. BC-enabled hosts run as a Windows service and can function without logging into the system.

### Drive letter and disk number assignments do not persist through a BC-enabled host reboot

*Description:* The drive letters and disk numbers that BC assigns to dynamically mounted devices do not persist through a BC-enabled host reboot. The BCV devices remain present after the reboot, but the drive letters and disk numbers originally assigned to the devices might change. The new drive letters and disk numbers depend on the order in which Windows discovers the devices. This issue affects any volume-style BC job containing a changed disk letter or disk

number. BC jobs must account for both the drive letter and disk number for devices. After a BC-enabled host reboot, all volume-style jobs containing a changed device drive letter or disk number fail to run.

*Resolution:* Edit all BC jobs containing a changed device drive letter or disk number to the new letter or number assigned. The change in drive letter assignment does not affect BC functionality. BC can still remove the devices during execution of the job undo. However, user scripts might be affected.

## Mounts and dismounts fill up the Event Log

*Description:* Despite the plug-and-play nature of Windows 2000, this operating system is not fully compatible with the dynamic mount and dismount operations performed by BC. One side-effect is that each mount and dismount can generate entries in the Event Log. Device arrival and departure notifications from the Removable Storage Manager (RSM) service are the most common events. If Secure Path is installed, the `raidisk.sys` driver may also report path-failure errors during device removal.

*Applies to:* Windows 2000 only.

*Resolution:* These Event Log entries are not an indication of a problem and can be ignored. However, BC implementations that involve heavy mount/dismount activity can generate a significant number of log entries. When sizing the Event Log, size the log accordingly.

## Mounting problems

*Description:* **BC does not support Windows 2000 or Windows Server 2003 Dynamic Disks.**

*Resolution:* Although BC does not support Windows 2000 or Windows Server 2003 Dynamic Disks, BC does coexist with these devices on a BC-enabled host. On this host, non-dynamic disk LUNs and BCVs can be replicated and mounted without a problem.

*Description:* **New drive letter did not arrive.**

If a terminal services session is established, any mount operations performed on the BC-enabled host can fail.

*Resolution:* Ensure that no Terminal Services sessions are active while performing mount operations.

*Description:* **BCV mount fails for Windows Server 2003 cluster resources.**

The BC job fails when trying to mount the BCV of an active cluster node (disk resource) on a passive node. Error messages in the log files may indicate “new drive letter did not arrive.” This failure can occur with both disk and folder-mount operations.

This problem is due to a Windows Server 2003 limitation for cluster active/active and active/passive disks. When BC presents a BCV of cluster resource disk (on an active node) to a passive node, the cluster service blocks the arrival because the cluster has not failed the resource.

This behavior is expected for Windows Server 2003 cluster disk resources only.

*Resolution:* BC supports replication and mounting of disks except those managed by the Windows Server 2003 cluster service.

*Description:* **Job fails with error: New drive letter did not arrive.**

Under certain circumstances, Windows 2000 and Windows Server 2003 prevent a drive letter from being assigned to a newly mounted BCV. This error can lead to a failure of the BC job. Several possible causes exist for this problem:

*Cause 1:* ■ **There is no filesystem on the source.**

Clones and snapshots (BCVs) are point-in-time copies of their source volumes. If no filesystem exists on the source, the BCV does not contain a filesystem. For a device to be dynamically mounted on Windows, the device must contain a properly partitioned and formatted basic NTFS filesystem.

Devices that do not contain filesystems can still be mounted using the RAW option in the MOUNT step, but these devices are not assigned a drive letter.

*Resolution:* Place a supported filesystem on the source or use the RAW MOUNT operation.

*Cause 2:* ■ **The filesystem on the source is unsupported.**

BC supports homogeneous NTFS basic filesystems only. Windows Dynamic disks, GPT disks, FAT32 filesystems, and any third-party filesystems are not supported. The source version of the filesystem to be mounted must be native to the Windows version being mounted as the destination. For example, Windows 2000 volumes cannot be mounted on Windows Server 2003 systems, and so on.

*Resolution:* Use a supported filesystem.

*Cause 3:* ■ **The filesystem on the source is partially corrupt.**

Minor filesystem inconsistencies in the source volume can prevent the mount-on host from recognizing the BCV as a valid device. This condition can exist even if the source volume seems to be functioning normally. This condition happens most often with devices that were originally created on an older version of Windows.

*Resolution:* Run `chkdsk` on the source volume and repair any problems that exist. In extreme cases, the source volume needs to be backed up and then completely deleted and re-created again.

*Cause 4:* ■ **The incorrect version of Secure Path is being used.**

Some versions of Secure Path prior to v4.0c SP1 had problems that prevented drive letters from being assigned to new devices.

*Resolution:* Upgrade to Secure Path v4.0c or later.

*Cause 5:* ■ **User has logged in to the desktop of the mount-on host.**

The System Settings Change pop-up that displays intermittently on some Windows systems (see “[System settings change pop-up](#)” on page 125) can interfere with MOUNT operations and prevent the assignment of drive letters to new devices.

*Resolution:* Log off the desktop. If login is necessary, ensure that any System Settings Change pop-up windows are acknowledged within 15 seconds following display.

*Cause 6:* ■ **The wrong partition was specified in the MOUNT operation.**

If UNIT style operations are used in a BC job, users are responsible for ensuring that the correct partition number is entered in the MOUNT step. For example, some disks contain an 8-MB EISA configuration partition as the first partition. If choosing a disk like this as the source for a BC job, remember that the relevant filesystem resides on partition 2 of the disk.

*Resolution:* Ensure that the correct partition is specified in the MOUNT step of any UNIT style job. Alternatively, use VOLUME style operations for all BC jobs; partition associations are handled automatically with VOLUME style jobs.



## Applications restrict access or require privileges

**Description:** By default, processes executed by the SUSPEND, RESUME, LAUNCH, and LAUNCHUNDO job operations have the permissions of the System account. Some applications, such as Oracle, Microsoft Exchange, and Computer Associates BrightStor, restrict access to certain accounts or require privileges that are not available to the System account.

**Applies to:** Windows 2000 only.

**Resolution:** Change the account used by the BC-enabled host service (Switchboard) to support these cases. Complete the following procedure to make this change:

1. Click **Start > Run**.
2. Enter `services.msc`.
3. Click **OK**.  
The Services window opens.
4. Right-click on the Switchboard service and click **Properties**.  
The Switchboard Properties dialog box displays.
5. Click the **LogOn** tab.
6. Check **This account**.
7. Enter the desired account name and password.
8. Click **OK**.
9. Verify that no BC jobs are running.  
If BC jobs are running, wait until the job completes.
10. Restart the BC service (Switchboard) to allow the changes to take effect (see [“Stopping/starting BC-enabled host service”](#) on page 78).

## Mapped network drive problem in Windows Server 2003

**Description:** The indicated drive letter within the BC job does not map properly.

Active, mapped network drives are displayed on all BC-enabled hosts except for Windows Server 2003. This known issue can potentially lead to situations in which BC jobs that mount BCVs on these hosts run to completion, but *do not* actually mount the BCVs.

For example, if a BC job mounts a BCV as drive letter T:, even if T: is already in use, the job runs to completion. However, the BCV *does not* mount, and drive letter T: continues to be the mapped network drive. Once the BC job completes, the BCV must be manually mounted using an available drive letter.

**Resolution:** Ensure that mount operations conducted on Windows Server 2003 hosts *do not* conflict with any mapped network drives present on the mount-on host.

## Extra disk icon with question mark displays in Windows Server 2003, Windows Explorer view

**Description:** For Windows Server 2003, if Windows Explorer is open, an extra disk icon with a question mark (?) displays occasionally when new BCV devices are mounted. This extra icon is a side-effect of the dynamic device mapping process and *does not* indicate a problem.

**Resolution:** Close and re-open Windows Explorer to remove the extra disk icon.



# Complete BC Product History



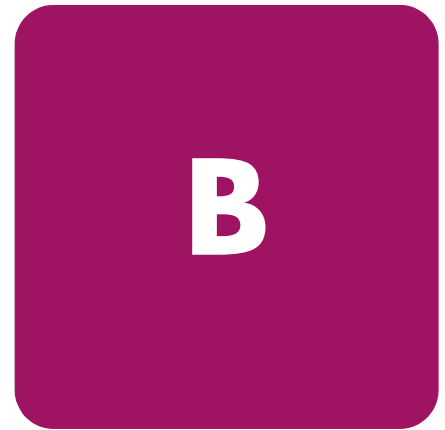
Table 46 provides the complete BC product kit and Web update history, previously known as EVM.

**Table 46: Complete BC product history**

Release date	Version	Software contents
October 2001	EVM v2.0	EVM Server v2.0 EVM Host Agent v2.0 for Windows 2000/NT
December 2001 Web update only	EVM v2.0a	EVM Server v2.0a EVM Host Agent v2.0a for AIX
January 2002 Web update only	EVM v2.0b	EVM Server v2.0b EVM Host Agent v2.0a for AIX EVM Host Agent v2.0b for Solaris
April 2002 Web update only	EVM v2.0c	EVM Server v2.0c EVM Host Agent v2.0a for AIX EVM Host Agent v2.0b for Solaris EVM Host Agent v2.0c for Tru64 UNIX, HP-UX, and Windows 2000/NT
August 2002	EVM v2.0d	EVM Server v2.0d EVM Host Agent v2.0d for: Tru64 UNIX, HP-UX, AIX, Solaris, and Windows 2000/NT
March 2003	BC v2.1	BC Server v2.1 BC Host Agent v2.1 for: Tru64 UNIX, HP-UX, AIX, Solaris, and Windows
May 2003	BC v2.1a	BC Server v2.1a BC Host Agent v2.1a for: Tru64 UNIX, HP-UX, AIX, Solaris, and Windows
October 2003	BC v2.2	BC Server v2.2 BC Host Agent v2.2 for: Tru64 UNIX, HP-UX, AIX, Solaris, Windows, and OpenVMS
September 2004	BC v2.3	BC v2.3 Server BC v2.3 Host Agent for: Tru64 UNIX, HP-UX, AIX, Solaris, Windows, OpenVMS, and Linux



# BC Environment Configuration Worksheets



This appendix contains three BC environment planning worksheets for your convenience:

- [Table 47: BC environment configuration worksheet](#), page 132
- [Table 48: BC environment host computer worksheet](#), page 133
- [Table 49: BC environment storage systems worksheet](#), page 135

**Table 47: BC environment configuration worksheet**

BC environment configuration worksheet		
Environment name: _____		
Component	Current version	Tasks
Storage systems planned or in use:		
■ EVA: how many _____		
■ MA: how many _____		
■ EMA: how many _____		
Storage managers planned or in use:		
■ HSG Element Manager		
■ Command View EVA		
BC server planned or in use		
SMA planned or in use:		
■ Hardware		
■ Software		
Firewall		

**Table 48: BC environment host computer worksheet**

BC environment host computer information						
Environment name: _____						
Host computer name	OS	FCA/HBA	Platform kit	Secure Path	BC version	Tasks/remarks
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						

**Table 48: BC environment host computer worksheet (continued)**

BC environment host computer information						
Environment name: _____						
Host computer name	OS	FCA/HBA	Platform kit	Secure Path	BC version	Tasks/remarks

**Table 49: BC environment storage systems worksheet**

BC environment storage systems information			
Environment name: _____			
Storage system name	Controller type	ACS/VCS version	Tasks/remarks
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			
21.			
22.			

**Table 49: BC environment storage systems worksheet (continued)**

[illegible]



## glossary

This glossary defines terms that are used in this guide or are related to BC.

### **archive bit**

In a Windows operating system, an attribute flag in a file that indicates whether the file should be archived. A value of true (1) indicates that the file is new, or has been modified since it was last backed up in a full incremental backup. A value of false (0) means the file has not changed.

### **BC environment**

A SAN environment in which Business Copy replication features are available. BC features can be available through various means, such as: storage managers, BC server and jobs, BC host agents, command line interfaces, and script files.

### **BC network**

The portion of a SAN that consists of a BC server connected via LAN to BC-enabled host computers.

### **BC server platform**

An SMA or SMS with BC server software installed.

See also [Storage Management Appliance](#) and [Storage Management Server](#).

### **BCV**

Business Continuance Volume. A generic term for a virtual disk that is created from a production volume. A BCV can subsequently be used in production tasks such as backups, applications migration, data mining, and testing. A key feature of a BCV is that it can be accessed while the production volume remains online for normal I/O. The term BCV does not imply the use of any specific technology.

### **CLI**

Command Line Interpreter or Interface. In StorageWorks, a text-oriented command line interface that enables configuration and monitoring of storage systems by manually issuing commands to the array controller.

### **CLI commands**

The set of commands supported by StorageWorks array controller software. For example, the command `SHOW DISKS` displays a list of disks attached to the controller.

### **client**

A computer or program that requests a service of another computer in a client/server system.

### **clone**

In StorageWorks MA/EMA products, a controller-based method of creating a physical copy of a virtual disk. A duplicate member is created and the members of the mirrorset are normalized to ensure that the data is identical on each member. During creation and normalization, the original unit remains online. Normalization of members is not instantaneous, but depends on factors such as disk size and I/O activity. Virtual disks created by the clone method are often used for tasks such as backups and application testing. The clone method cannot be used with RAID 3/5 units.

**Command View EVA**

A Web-based storage environment manager that enables users to configure and monitor EVA controllers. This storage manager resides on any supported BC server platform.

**daemon**

Diagnostic and Execution Monitor. Pronounced “demon.” A program usually associated with a UNIX system that performs a utility (housekeeping or maintenance) function without being requested or even known by the user.

See also [service](#) for similar functionality under Windows.

**disk group**

See [volume group](#).

**domain**

A set of one or more physical volumes from which space can be allocated to one or more logical volumes.

**Fibre Channel**

A high-speed, serial bus technology that supports channel and network architectures and a variety of transmission media and protocols. Fibre Channel Arbitrated Loop (FC-AL) is standard designed for mass storage and other peripheral devices. FC-AL uses optical fibre to achieve transfer rates up to one GB per second.

**host**

In networked storage, a computer that can perform I/O with a storage array. In general networking, any computer on a network that provides a service.

**host agent**

In a client/server system, a program that performs information gathering or processes tasks on behalf of a client or server. Agents often communicate with other agents to perform a collective task on behalf of the user.

**host, BC-enabled**

A host computer that has BC host agent software installed. Compare to standard host.

**HSG Element Manager**

A Web-based storage environment manager that enables users to configure and monitor MA/EMA controllers. The HSG Element Manager resides on the SMA.

**instance**

The presence of a program or set of related programs in a computer or storage system.

**job (BC job)**

A file created by BC that represents a user request to perform a task or series of tasks. For example, the BC job named `sales_daily_backup` might:

1. Replicate virtual disks to create BCVs.
2. Mount the BCV on a server.
3. Start the tape backup of the BCV. Jobs can be created and run from the GUI, the BC command line (EVMCL), script files, or a scheduler.

**logical volume**

A logical volume is a storage space that can be used by a logical volume manager for a file system, device swap space, etc. Under some LVM implementations, logical volumes are simply called volumes.

**Logical Volume Manager**

Logical Volume Manager (LVM) is the generic term given to a set of features for managing disk storage in terms of space, rather than physical devices. Under an LVM, disk storage is a resource pool that includes volumes that can be easily resized and re-allocated by a systems administrator. LVM features are typically included in UNIX operating systems.

**LUN**

Logical Unit Number. In a storage system, the value that identifies logical storage units of a SCSI target device.

**mount point**

In UNIX systems, the directory to use for mounting a device. For example, the `/usr` directory could be the mount point for the disk device `/dev/dsk/c0t1d0s6`.

**OpenView**

An HP line of software products that provides storage management solutions, data protection and recovery, automatic performance tuning, storage virtualization, and other features for multivendor storage environments.

**physical volume**

Physical Volume is a term used by a logical volume manager (LVM) to indicate a physical disk. When an LVM is used in conjunction with a storage system, LVM physical volumes are mapped to virtual disks (units, LUNs) on the storage system.

**process**

A program usually associated with an OpenVMS system that performs a utility (housekeeping or maintenance) function without being requested or even known by the user.

**RAID**

Redundant Array of Independent Disks. A set of techniques for configuring and using an array of physical disks to provide fault tolerance and increase performance of a MA/EMA array storage system. RAID techniques are identified by level numbers. Some common levels are:

<i>Level</i>	<i>Redundancy</i>	<i>Technique</i>
RAID 0	None	Striping
RAID 1	High	Mirroring
RAID0+1	High	Striping and Mirroring
RAID 3	Medium	Striping and parity
RAID 5	Medium	Striping and parity

**raw disk**

A disk or disk space that is not under the control of a file system. Typically, a raw disk is under direct control of a database or similar application.

**SAN**

Storage Area Network. A dedicated, high-speed network of storage devices that are available to servers on a LAN or WAN. As storage devices are added to the SAN, they become accessible to the servers in the larger network.

**scheduler**

An application that schedules and runs tasks. A typical scheduled task in the StorageWorks environment is running a BC job that replicates storage units for use in tape backups.

**server**

A computer or program that provides a service to other computers in a client/server system. Servers often run continuously, waiting for requests from clients.

**service**

In Windows, a program or process that conforms to the Microsoft Windows Service Control Manager specification. Windows services generally perform a low level function without being requested by the user.

BC specific. The BC server and the BC host agent for Windows are installed as services. As a service, BC does not affect the Windows user interface (desktop) or require that a user be logged on.

See also [daemon](#) for similar functionality under UNIX.

**SMA**

See [Storage Management Appliance](#).

**SMS**

See [Storage Management Server](#).

**snapclone**

A copy that begins as a fully allocated snapshot then becomes an independent virtual disk. Applies only to EVA array storage systems.

**snapshot**

In StorageWorks storage systems, a nearly instantaneous controller-based method of creating a virtual copy of a virtual disk. During creation the source virtual disk remains online and there is no interruption of operations.

**storage manager**

A Web-based storage environment manager that enables a user to configure and monitor MA/EMA or EVA controllers. The HSG Element Manager resides on the Storage Management Appliance (SMA); Command View EVA resides on the BC server platform.

**Storage Management Appliance**

SMA. A host-independent server product designed to connect directly to the SAN fabric. The SMA provides a centralized point for managing and monitoring SAN elements, including HP switches and storage arrays. SMA software installed on the appliance provides a GUI interface for accessing the monitored SAN environment. The SMA software also provides a launch site for a variety of value-added HP OpenView applications and provides navigation links to directly manage storage components on the SAN.

**Storage Management Server**

SMS. Any HP supported hardware-software platform that is not connected to the SAN fabric and that does not serve as a storage host. SMS software installed on a platform provides a GUI interface for accessing the monitored SAN environment.

**StorageWorks**

An HP line of hardware and software storage solutions that provides storage management solutions, data protection and recovery, automatic performance tuning, storage virtualization, and other features for multivendor storage environments.

**TCP/IP**

Transmission Control Protocol/Internet Protocol. A suite of communications protocols used to connect host computers to the Internet.

**undo (BC job)**

A special job file that is automatically created by BC for “undoing” steps that have been completed in a user-created job. For example, the job named `undo_stor1_backup_daily_sales` could be run after a tape backup was completed. The undo could unmount the BCV units and return their disks to the pool of free storage resources.

**unit (MA/EMA only)**

In StorageWorks storage systems, an identifier that the controller uses when a container is mounted on a host computer. For example, the unit identifier DI could represent a RAID 0+1 striped mirror set that is mounted on a host computer. StorageWorks disk units begin with the letter D and tape units begin with the letter T.

**VCS**

Virtual Controller Software. The software and firmware that, together with the hardware, implements the features of StorageWorks array controllers.

**virtual disk (EVA only)**

In StorageWorks storage systems, a simulated disk that is created from physical disks in a storage array for use by hosts.

**volume**

A generic term for a storage unit. In some logical volume managers, volume is name used for LVM logical volumes.

**volume group**

A term used by a logical volume manager (LVM) for a pool of storage space that consists of specific physical volumes (physical disks). Once created, a systems administrator can allocate the storage space into logical volumes. Under some LVM implementations, volume groups are called disk groups.

*See also* [disk group](#).

**Vraid**

Virtual RAID. A set of techniques for configuring and using an array of physical disks to provide fault tolerance and increase performance of an HSV-based storage system. Level numbers identifies Vraid techniques. Some common levels are:

<i>Level</i>	<i>Redundancy</i>	<i>Technique</i>
Vraid0	None	Striping
Vraid1	High	Mirroring
Vraid5	Medium	Striping and parity



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